Utah STEM School Designation
2015-2016
Application Packet

Pre-Application Deadline:
October 1, 2015

Application Deadline:
December 18, 2015

Utah State Office of Education

STEM Action Center with the Governor's Office of Economic Development

Utah STEM SCHOOL DESIGNATION – School Application Overview

1. **School Information**
   Name of School: Neil Armstrong Academy
   Address: 5194 Highbury Parkway West Valley, UT 84120
   Phone: 385-646-5284
   Website: http://schools.graniteschools.org/armstrong/
   Public/Charter/Private: Public

2. **Lead Contact for STEM School Designation Application**
   Name: Matt Goebel
   Email: mgoebel@granitesd.org
   Position: Administrator

3. **Members of the STEM Schools Designation Application Team**
   Matthew Goebel (Administrator)- mgoebel@granitesd.org
   Tyler Howe (Administrator)- ahowe@granitesd.org
   Monica Thayer (Assistant Administrator) - mthayer@granitesd.org
   Mysti Hedquist (Teacher) mhedquist@granitesd.org
   Cyrus Moulder (Instructional Coach) cemoulder@graniteschools.org
   Carrie DiVall (Parent, Community Council Member) kookdivall@yahoo.com
   Robert Goodick (Parent, Community Council Member, STEM Partner) rggrvp@comcast.net
   Name, title, email for all members. Should include representation of administration, teacher, STEM partners, and stakeholder groups (such as community council, parents, etc.)

4. **What level are you applying for? (Bronze, Silver, Gold, Platinum)**
   Platinum
   Note: If you are applying for Gold or Platinum, you will be required to schedule a site visit for the STEM AC evaluation team in late January / February.

5. **In 250 words or less, please describe the STEM vision for your school.**

Mission Statement

At Neil Armstrong Academy, we are committed to a focus on learning, high levels of engagement, and a problem-solving process common to the science, technology, engineering, and math (STEM) fields to prepare all students with the skills they will need for their future.

Vision Statement

Teachers and staff will continuously focus on student-learning outcomes as they work collaboratively to address the questions: (1) What do we want our students to learn? (2) How will we know when each student has learned it? (3) How will we respond when some students don't learn? and (4) How can we extend and enrich the learning for students who have demonstrated proficiency? We will use many forms of data to drive student achievement.

Collective Commitments

- I am responsible for my own learning.
- I will feel safe to try, fail, and try again until I succeed. I will encourage others to feel safe as well.
- I will share my skills, talents, and ideas, and be open to change.
- I am committed to the belief that everyone can learn.
- I will participate during group activities, and I will speak positively with one voice once the group has chosen a direction even if it wasn't my first choice.
- I will make a difference in the community.

1. **Curriculum: Problem-Solving Rigorous Learning**

STEM Curriculum is selected based on Utah Core Standards. The curriculum has an articulated interconnectedness between science, technology, engineering and math. Curriculum and instruction are coordinated between the various aspects of STEM. Projects form a substantial part of the curriculum.

Element	Non-Existent – 0 points	Developing – 1 point	Existing – 2 points	Exemplary – 3 points *(In addition to all "Existing" indicators)*
1a. Interdisciplinary Instruction Helps Students Make Interdisciplinary Connections *There are collaborative team(s) comprised of teachers who teach different disciplines. Students identify ways that disciplines are interrelated, reinforced, and complement one another.*	The school does not include and/or does not have evidence of this element in practice at this time.	Work is in progress to develop this element within the school. This element is included in the school's STEM planning document.	- Teachers ask students to think about how the content of the lesson relates to other STEM disciplines. - Students are asked to apply what they learned in another subject to a lesson, assignment, or activity at least once per month.	- Teachers ask students to think about how the content of the lesson related to ALL other disciplines. - Students are engaged in an integrated unit that articulates interdisciplinary connections one or more times per week.

Teachers at Neil Armstrong Academy work diligently to integrate STEM principles into all of the Utah State Core curriculum on a daily basis. For example, in first grade, students are asked to connect their learning about animals to what they have read about them in their reading units. Next, students are asked to use that information to write informative essays using facts they learned through their research. After students have written their informative essays, they use the StoryKit app on their iPads to detail what they learned about, and present their StoryKits to their peers (Figure 1). Also, as part of their weather unit, students connect literature on weather to current weather events (Figure 2). The first graders read stories about the weather, connect what they read about it to current weather patterns during class discussions, then rotate to different first grade teacher's classrooms to learn about more specific types of weather through hands on experiments.

Second grade makes several connections to various components of the curriculum throughout the year. One set of integrations examples

can be found as students learn about the community. Students create a local community with LEGOs. Students then have discussions on the community and create presentations using various apps of their choosing. The students then write about various problems (lack of signs, speed limits, etc.) and update their communities accordingly. This learning cycle continues for several weeks and presentations are altered to fit the changes made in the LEGO community (Figures 3 and 4).

Every year, fifth grade students go on a field trip to J.A. City at Discovery Gateway. As part of the J.A. BizTown experience, students learn interview skills, how to write a resume, and are given jobs. While at the city, they operate banks, manage restaurants, schools, and other businesses; perform their civic duty by voting for a city mayor, develop budgets and manage their business and personal finances. While working as employees, students are paid for their labor and are expected to use their math skills to manage their personal checking accounts. The goal of this opportunity is for students to develop a strong understanding of the relationship between what they learn in their classrooms and their successful participation in a worldwide economy (Figures 5 and 6).

Figure 1. 1st Grader Using Story Kit

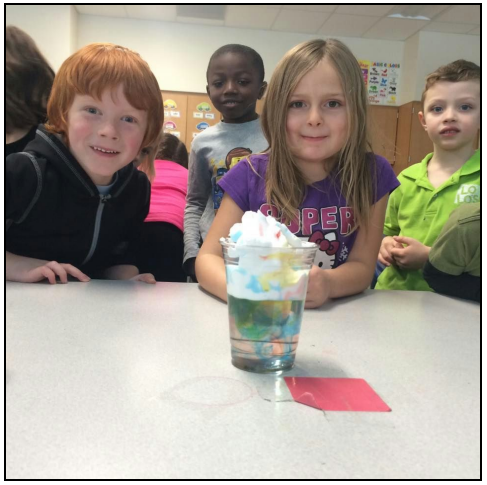

Figure 2. 1st Grade Weather Experiments

Figure 3. 2nd Grade Lego City

Figure 4. 2nd Grade Lego City

Figure 5. 5th Grade J.A. Biztown Interview

Figure 6. 5th Grade J.A. Biztown on the job.

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1b. Problem-Solving Learning *Learning is student-led, interdisciplinary, and engaged in real-world content and multiple solutions for student cooperation utilizing STEM knowledge and skills. Problem-solving learning at this school requires a thorough process of inquiry, knowledge building, and resolutions. Curriculum includes projects, often interdisciplinary and ranging from short- to long-term, which are focused on solving an authentic problem.*	The school does not include and/or does not have evidence of this element in practice at this time.	Work is in progress to develop this element within the school. This element is included in the school's STEM planning document.	- Problem-solving learning (short-term) is evident in lessons/activities at least once per month in the STEM curriculum. - Problem-solving learning in projects (long-term) is evident in the STEM curriculum at least three times per year. - Students are required to do research for problem-solving learning at least three times per year.	- Problem-solving learning in short-term projects is evident in lessons/activities at least once per week in the STEM curriculum. - Problem-solving learning in long-term projects is evident in the STEM curriculum at least five per year and three per year in other disciplines. - Problem-solving learning in long-term projects at the school draw from multiple courses or subjects.

The staff at Neil Armstrong Academy have been focused on providing students with authentic project-based learning opportunities that target both STEM curriculum and all grade-level curriculum found in the Utah Core Standards. Projects are created and based on student interests, problems facing today's world, or problems and situations found in throughout history. For example, the sixth grade team provides their students with several project-based learning opportunities throughout the school year. Many of these projects tie in STEM curriculum and integrates language and social studies. Students design and build Greek temples, Egyptian pyramids, and a variety of other era-specific structures (Figure 1). The sixth graders are also involved in designing gingerbread houses that withstand specific amounts of force, a bungee system for a Barbie drop,

headphones that work to muffle sound, and a long-term project on waste collection a home (Figure 2). Students work on these projects throughout the school year and are continually mastering skills across various curriculums.

The fourth and fifth grades have also designed several long-term projects that students take part in throughout the school year. For example, fourth grade has access to various trap cameras across the state and will classify animals that have been photographed (Figure 3). The students use a website to classify the animals and contact the research team. Fourth grade is also working with a wildlife foundation to hatch fish at the school (Figure 4). Students observe the eggs and fish on a weekly basis and work with the hatchery to hatch the fish and grow them to a proper length and size. Fifth grade uses Minecraft to teach STEM, language, and social studies standards. Students are spawned into an area and are tasked with engineering a town in small groups. Students are expected to survive in their new areas and this is compared to what the Pilgrims had done when they arrived in North America. The teams eventually leave their towns and move west, continuing to strategize, journal, and compare and contrast their situations to those of the early Americans (Figure 5). Fifth grade has a coordinate mapping project that they do. Students use Google Maps and other tools to create a coordinate grid to map various places throughout the state of Utah (Figure 6). Another project the fifth grade class works through is an engineering project that is attached to Maniac Magee by Jerry Spinelli. Students design a bridge out of toothpicks to mirror the events in the book. Students measure, design, and construct bridges in small groups (Figure 7). This merging of mathematics, language, and engineering allow the students to take a familiar situation and work through a series of problems they are confronted with throughout their design process.

The younger grades also have various long and short-term projects that students take part in throughout the school year. First grade took part in a animal habitat project in which the students researched animal habitats and built habitats as teams and individually. The projects were shared and put on display in the STEM lab (Figure 8). Students also took part in a Skype project in which they connected with other classes to learn about animals and play games. Second grade also worked on animal habitat, but were posed with a different set of circumstances and objectives. Students researched different animals and habitats in collaborative groups, and put together presentations using tablet applications. Students then build QR codes to allow others to quickly access the material that was put together by the students (Figure 9). Finally, the third grade team created a series of nursery related projects. One of these projects allowed students to build terrariums (Figure 10). Students grow their own sets of terrariums, observe changes over time, and used worms to help their plants grow. Students then put together presentations using Story Kit and Tellagami on iPads.

Figure 1. 6th Grade Pyramids

Figure 2. 6th Grade Bungee Barbie Drop

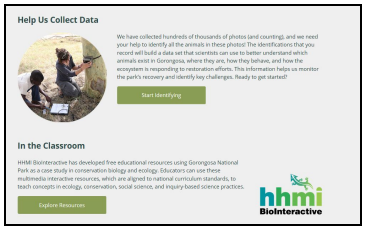

Figure 3. 4th Grade Trap Cam

Figure 4. 4th Grade Fish Hatchery

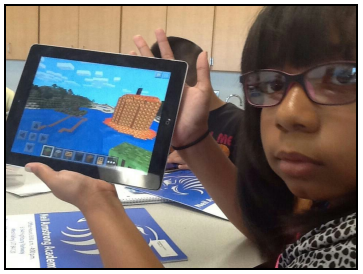

Figure 5. 5th Grade Minecraft Project

Figure 6. 5th Grade Coordinate Mapping

Figure 7. 5th Grade Bridge Building Project

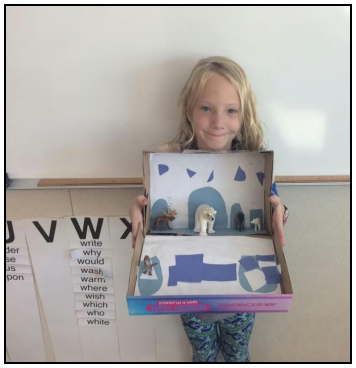

Figure 8. 1st Grade Animal Habitats

Figure 9. 2nd Grade Animal Habitats

Figure 10. 3rd Grade Soil and Terrariums

1. <u>Curriculum: Problem-Solving Rigorous Learning</u>

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1c. Student Cooperation *Students learn from each other and work well together.*	The school does not include and/or does not have evidence of this element in practice at this time.	Work is in progress to develop this element within the school. This element is included in the school's STEM planning document.	- Students collaborate and work as teams in STEM disciplines at least once per week. - Student products in STEM disciplines reflect group learning interactions at least once per month. - Students are engaged in giving and receiving constructive feedback to peers in STEM learning cooperative settings at least three times per year.	- Students collaborate and work as teams in all disciplines at least once per week. - Student products in all disciplines reflect group learning interactions at least once per month. - Students are engaged in giving and receiving constructive feedback to peers in all course cooperative settings at least three times per year. - Students use appropriate technology as available for collaborative work, communication, research and data collection/analysis, in projects and other assessments daily.

As part of Neil Armstrong Academy's Collective Commitments, students and teachers are asked to share their skills, talents, and ideas. They are also expected to participate in group activities. Every student in the school collaborates and works in teams on a daily basis, during a variety of core subject lessons.

Students at the school are frequently seen in classrooms, STEM labs, large group rooms, the greenhouse, and the outdoor classroom using different forms of technology while working collaboratively in groups on projects that span different core subject areas with the expectation that they will produce an artifact that will demonstrate what they learned. For example, first grade students work collaboratively with a partner using the Show Me app to work a math problem and record themselves explaining their thinking (Figure 1). When they are done, they share what they learned with their classmates and receive feedback from their peers about whether their mathematical reasoning made sense and worked. In a separate example, students used Skype to take part in a discussion with a separate classroom on animal habitats. Students in one classroom Skype students in another first grade classroom. One classroom chooses an animal, and the other class has to ask questions about animals and their habitats, using yes or no questions to discover what the animal is. For example, students will ask if it is a mammal, if it lives in the desert, etc. Students narrow down the possibilities and work together to determine the species (Figure 2).

Another example of students working collaboratively in groups is in fourth grade. Students use the Wild Cam trap camera to classify animals caught on camera for scientists. Next, they create a dichotomous classification key, and report the animal to the scientists on the scientist's website. Lastly, they use the PicCollage app on their iPads to create a presentation that shows the picture of the animal, the name of the animal, and short description of the animal (Figure 3). When they are done, they present their findings to their classmates.

Students in third grade work collaboratively in groups while learning about fractions (Figure 4). They work in groups using the ShowMe app to create fraction presentations with candy. Students also work in groups to create a math review for the order of operations. They present what they learn using their iPads, AppleTV, and Smart Board. Students then critique each other's work to see if the problems were solved correctly.

Students in Kindergarten worked in groups to create a music video about friendship (Figure 5). They worked together to memorize their part for the music video, recorded the video with the help of their teachers, and presented the video at their Kindergarten graduation. The video was also put on ABC News to help the students at Armstrong learn about friendship and how to be leaders.

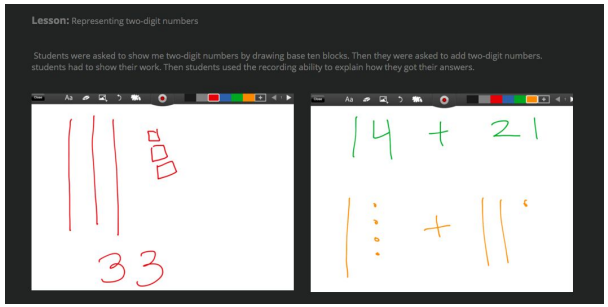

Figure 1. First Grade Show Me

Figure 2. First Grade Skype

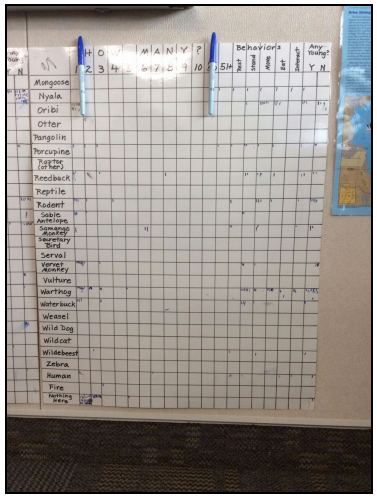

Figure 3. 4th Grade Trap Camera data gathering.

Figure 4. Third Grade Fractions

Figure 5. Kindergarten Music Video

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1d. Connections to the Real-World and Current Events *Students make connections between what they are learning and real-world experiences, current events, and/or their daily lives.*	The school does not include and/or does not have evidence of this element in practice at this time.	Work is in progress to develop this element within the school. This element is included in the school's STEM planning document.	- Instruction regularly helps students to better understand current events and/or issues. - Students are required to apply knowledge learned in the classroom to conceptual or theoretical real-world scenario at least three times per month in STEM disciplines.	- Instruction consistently helps students to better understand current events and/or issues, including those specific to Utah, the United States, and international communities. - Students are required to apply knowledge learned in the classroom to conceptual or theoretical real-world scenarios at least three times per month in all disciplines.

The faculty at Neil Armstrong are committed to providing our students with regular real-world opportunities to apply their learning. This happens in all grades and at multiple times throughout the school year. In all grades, teachers relate mathematical concepts to real world standards. For example, the sixth grade team designed a project that required students to calculate the weight of a satellite to determine the amount of solar panels needed to power the machine (Figure 1). Students had to take into account the amount of power given by one solar panel (through its surface area) and apply the information to the problem. First grade was tasked with calculating the strength of a bridge and building a bridge strong enough to hold specific amounts of weight (Figure 2). In addition to the mathematics concepts, teachers create real world problems for students using curriculum from a host of subject areas. The fourth grade team uses trap cameras to connect local animals to specific biomes and create projects that allow students to look at fossils of animals and planets in specific areas (and how natural forces play into this relationship),

soil profiles, and other projects. Fifth grade takes part in BizTown (Junior Achievement of Utah), a program that encourages students to make connections between what they learn in school and what happens in the real world. Students learn about jobs, interview for positions, go to work (at JA City), earn money, manage finances, make purchases, and vote for a Mayor (Figure 3).

Neil Armstrong Academy has several strong relationships with various members of the community. These contacts visit the school often and connect learning targets to real world events, problems, and jobs. For example, the fourth grade has teamed with the University of Utah to offer a brain presentation and activities to students. Student learn about the brain and it's functions, they examine human brains, watch cockroaches dance as electricity courses through their bodies, and engage with professionals in the field (Figure 4). Fourth grade also works with a professor and his team to classify animals in the state of Utah (using trap cameras), as well as with a hatchery to grow fish at the school (Figure 5). Sixth grade teams up with Target to give students an opportunity to visit the market and price items, determine the best price for items, and calculate differences (Figure 6). These are just a few examples of opportunities where students have taken what they've learned in the classroom and have been given real-world scenarios to apply them to.

Finally, the greenhouse/nursery gives all students at the school an opportunity to work with plants and soil and apply their knowledge in a number of ways (Figure 7). Students learn about cycles for plants, learn about nurturing something, how to calculate changes over time, make hypotheses, and relate this work on a local or global scale. For example, when fifth grade reads about an article in Time for Kids that discusses climate change, deforestation, or a host of other topics, they are able to relate this to the work they do in the nursery - how plants provide oxygen, take in carbon dioxide, their importance, etc. This is something all levels are able to take part in because all classes are assigned an area in the nursery and greenhouse.

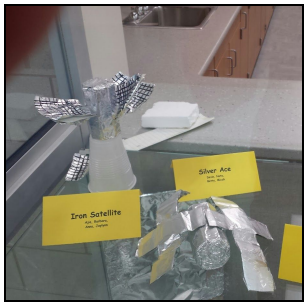

Figure 1. Sixth Grade Satellites.

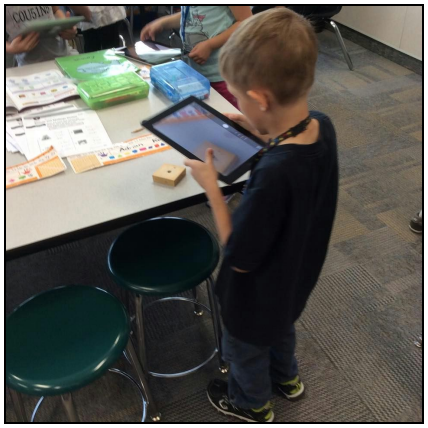

Figure 2. First Grade Bridge Planning.

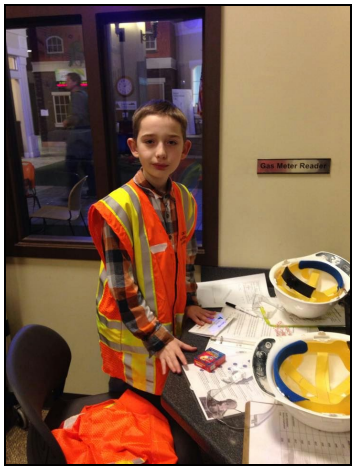

Figure 3. Fifth Grade JA City.

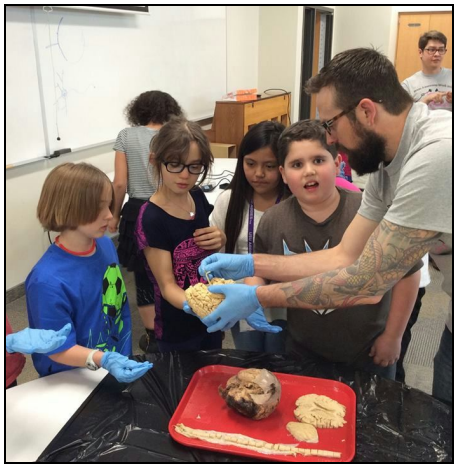

Figure 4. Fourth Grade Brains with U of U.

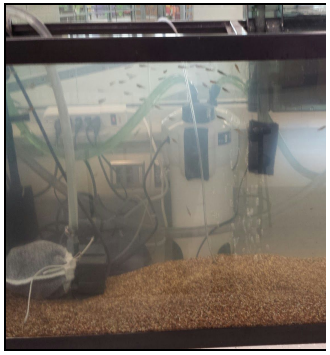

Figure 5. Fourth Grade Fish Hatchery.

Figure 6. Sixth Grade at Target.

Figure 7. Students Working in the Nursery

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Element	Non-Existent – 0 points	Developing – 1 point	Existing – 2 points	Exemplary – 3 points *(In addition to all "Existing" indicators)*
1e. Engineering Design Process *The teacher supports students' use of an engineering design process (prototype, test, evaluate, and revise).*	The school does not include and/or does not have evidence of this element in practice at this time.	Work is in progress to develop this element within the school. This element is included in the school's STEM planning document.	- Engineering design process is the focus of science and CTE classroom curriculum at least twice per year. - One problem-solving learning project per year requires development of a product/outcome utilizing the engineering design process in most STEM classes.	- The engineering design process is the focus of science and CTE classroom curriculum at least four times per year. - The engineering design process is referenced in all classes as a possible strategy to addressing a problem.

Teachers at Neil Armstrong Academy fully support student use of the engineering design process. They plan many lessons that engage students to create prototypes, conduct tests, evaluate their designs, and then revise them. For example, the fifth grade teachers have students design and build bridges that connect to their reading of the novel *Maniac Magee* by Jerry Spinelli. The goal is for students to design and create a bridge using toothpicks and glue, and have said bridge hold the maximum amount of weight. Students research the different types of bridges using their iPads. Next, they use the Show Me app, or the Doodle Buddy app to sketch their design of the bridge from the front, side, and the top. After they sketch their design on their iPads, they start building their prototype using wood glue and toothpicks (Figure 1). During the process, students

take pictures of their progress, and at the end, create a presentation using an app of their choice to explain what they learned from the engineering process and present it to the class.

For Valentine's Day, fifth graders design and create Complex Machine Valentine's boxes using three or more simple machines. The purpose of the box is to help students pass out Valentines. The simple machines have to have a purpose for being a part of the box. For example, they place wheels on the box so it can move around, but they cannot place a wheel on the box in a place that does not serve a purpose. On Valentine's Day, students present their boxes to the class and explain how their complex machine work. Afterwards, students passing out Valentine's get to test how each complex machine works (Figure 2).

The sixth grade classes engage in several cross-curricular STEM activities that bolster the development of problem solving strategies. One notable example is the house building challenge. Students are given a challenge to work in groups to design and build cardboard houses with a given volume. They must employ some fairly complex mathematics do find working dimensions for their structures. Once their structures are complete, students are introduced to the science aspect of the challenge. They view a short video about home efficiency inspections, and then they place their newly constructed "homes" over a light bulb. They then use the "thermal camera" feature on their iPads to identify areas where heat might be escaping through conduction, convection, and radiation. They then assemble needed materials and "insulate" their homes (Figure 3). Temperature readings are taken before and after students install insulation, and students write about what they learned about heat transfer and heat loss from the activity. Such activities embody the STEM ideal, and successfully blur the lines between disciplines.

Lastly, many grade levels have students design and build Rube Goldberg machines (Figure 4). Students design, build, test, evaluate, and revise their machines many different times to get their machines to work properly. During the process, students photograph and video-record each test with their iPads. When they are done testing their machines, students use the iMovie app or the Cute Cut app to create their video to present to the class over AppleTV.

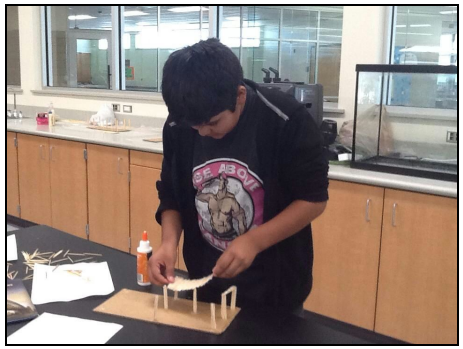

Figure 1. 5th Grade Bridge Building.

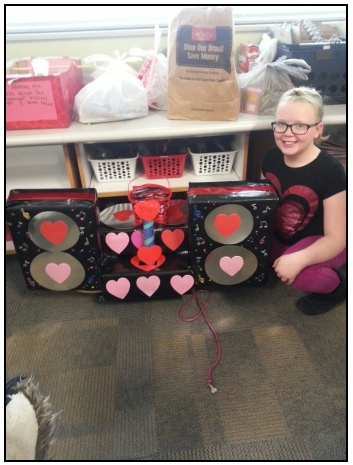

Figure 2. 5th Grade Simple Machine Valentine's Box.

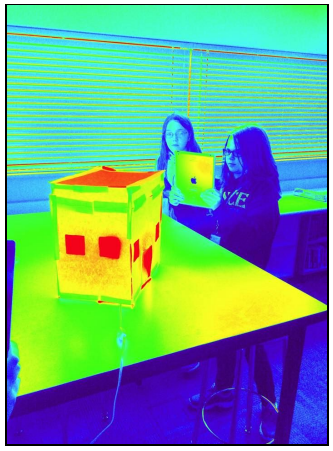

Figure 3. 6th Grade House Building/ Conservation of Heat.

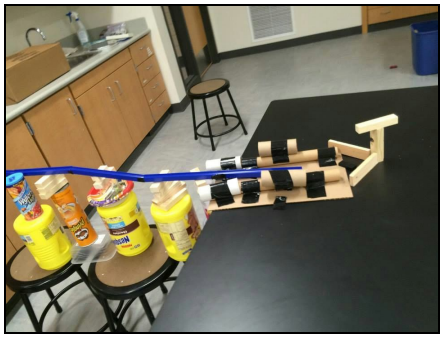

Figure 4. Rube Goldberg Machine.

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Element	Non-Existent – 0 points	Developing – 1 point	Existing – 2 points	Exemplary – 3 points *(In addition to all "Existing" indicators)*
1f. Standards and Core Course Sequence *The school takes standards (Utah Core Standards, 21st Century Skills (http://www.p21.org/), etc.) into account in school scheduling/curriculum design/instruction.*	*N/A Standards-based instruction aligned to the Utah Core Standards is central to instruction. Schools need to have this element in place to be eligible for STEM School Certification.*	N/A *Standards-based instruction aligned to the Utah Core Standards is central to instruction. Schools need to have this element in place to be eligible for STEM School Certification.*	- Utah standards are the central component of all lessons for all classes. - Educators frequently review disciplinary standards for their subject area(s). - The curriculum is vertically aligned within programs, as well as to the current Utah Core Standards. - *Secondary schools:* The school provides a thoughtful rationale for the core course sequencing.	- Educators frequently review disciplinary standards for subject area(s) specific to their teaching assignment and other subject areas. - Educators utilize additional standard sets, such as 21st century skills, computer science standards, etc., to inform instruction. - Teacher teams vertically plan STEM instruction within schools. - *Secondary schools:* Students have opportunities to take STEM-based courses beyond the traditional grade-level requirements.

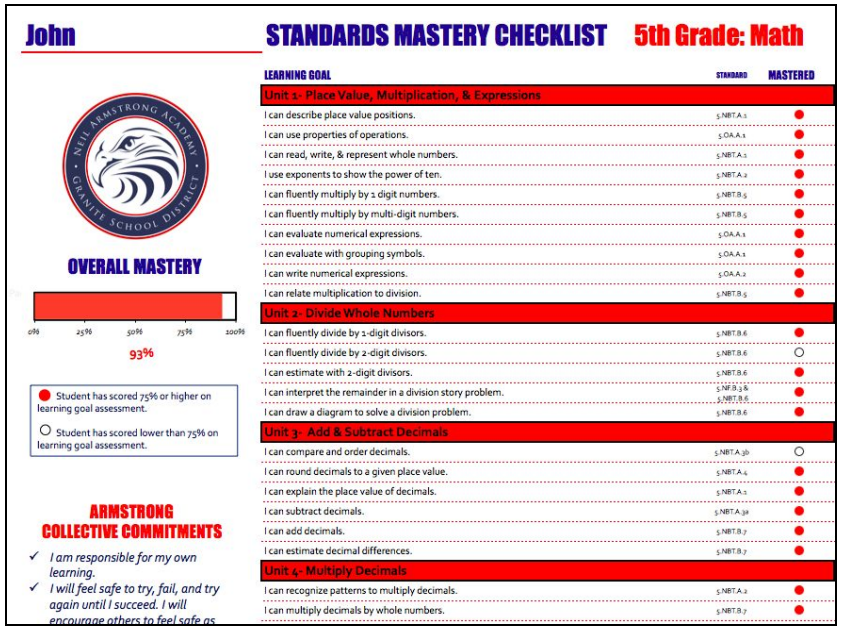
Neil Armstrong is ahead of the curve in its attention to the state standards. During collaboration, teachers work together to choose standards that are priorities. They then collaborate in designing instruction, assessments, interventions, and extensions to meet the learning needs of each student. These priority standards are incorporated into a standards based grading system that allows teachers to track student master by

the student and by the standard (Figure 1). These student standard trackers are shared with parents and the information about standards mastered is passed on to the student's next teacher and team.

As part of the PLC process, teachers review the Utah Core Standards for various teaching subjects on a weekly basis. Teachers review the standards to develop effective tier 1 instruction, to develop common formative assessments, and to create methods for determining intervention and extension groups. In addition to this, teachers review standards as they take part in various professional development opportunities. For example, for the 2015 - 2016 school year, teachers at Neil Armstrong are taking part in a professional development series that focuses on mathematics instruction. Because of this, teachers are required to know their math core inside and out to develop and deliver instruction that is consistent with the standards taught throughout the trainings.

Learning and utilizing 21st century skills is part of working and teaching in a STEM school. The vast majority of teachers at the academy have their master's degrees in educational technology or have their technology endorsement. Teachers utilize 21st century skills in the classroom to engage students in a number of ways (Figure 2). For example, project based learning is a vital component to the work that students to at the school. Students in all grades work on both short and long-term projects that allow students to think about projects in any number of ways to create solutions. This type of works helps create and nurture students that innovate, explore, communicate, find resources, and achieve in greater ways.

Collaboration is a vital component to what teachers take part in at the academy. Teachers meet with grade level peers at a minimum of three days per week. In addition to this, many teams meet additionally during planning time to help further their planning, instruction, and assessment cycles. Throughout the school year, teachers meet and discuss learning targets and goals in vertical teams (Figure 3). For example, this year's professional development series allows vertical teams to meet and discuss the math curriculum. Teachers gain a better understanding of what is taught in all grades in the building. Teachers also work together to discuss learning targets and potential student errors and misunderstandings that arise during instruction.



John

STANDARDS MASTERY CHECKLIST **5th Grade: Math**

NEIL ARMSTRONG ACADEMY · GRANITE SCHOOL DISTRICT ·

OVERALL MASTERY

0% 25% 50% 75% 100%

93%

● Student has scored 75% or higher on learning goal assessment.

○ Student has scored lower than 75% on learning goal assessment.

ARMSTRONG COLLECTIVE COMMITMENTS

- ✓ *I am responsible for my own learning.*
- ✓ *I will feel safe to try, fail, and try again until I succeed. I will encourage others to feel safe as*

LEARNING GOAL	STANDARD	MASTERED
Unit 1- Place Value, Multiplication, & Expressions		
I can describe place value positions.	5.NBT.A.1	●
I can use properties of operations.	5.OA.A.1	●
I can read, write, & represent whole numbers.	5.NBT.A.3	●
I use exponents to show the power of ten.	5.NBT.A.2	●
I can fluently multiply by 1 digit numbers.	5.NBT.B.5	●
I can fluently multiply by multi-digit numbers.	5.NBT.B.5	●
I can evaluate numerical expressions.	5.OA.A.1	●
I can evaluate with grouping symbols.	5.OA.A.1	●
I can write numerical expressions.	5.OA.A.2	●
I can relate multiplication to division.	5.NBT.B.5	●
Unit 2- Divide Whole Numbers		
I can fluently divide by 1-digit divisors.	5.NBT.B.6	●
I can fluently divide by 2-digit divisors.	5.NBT.B.6	○
I can estimate with 2-digit divisors.	5.NBT.B.6	●
I can interpret the remainder in a division story problem.	5.NF.3.3.B 5.NBT.B.6	●
I can draw a diagram to solve a division problem.	5.NBT.B.6	●
Unit 3- Add & Subtract Decimals		
I can compare and order decimals.	5.NBT.A.3b	○
I can round decimals to a given place value.	5.NBT.A.4	●
I can explain the place value of decimals.	5.NBT.A.1	●
I can subtract decimals.	5.NBT.A.3a	●
I can add decimals.	5.NBT.B.7	●
I can estimate decimal differences.	5.NBT.B.7	●
Unit 4- Multiply Decimals		
I can recognize patterns to multiply decimals.	5.NBT.A.2	●
I can multiply decimals by whole numbers.	5.NBT.B.7	●

Figure 1. Standards Based Grading

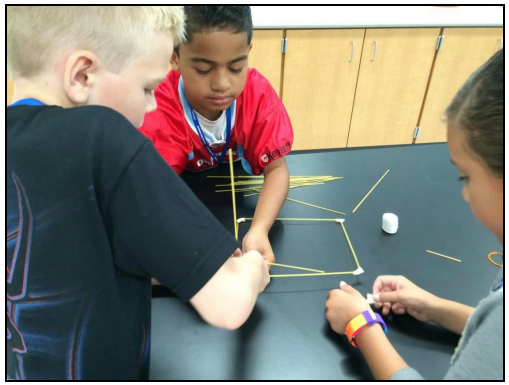


Figure 2. Project Learning in the STEM Lab

Figure 3. Teacher Collaboration

1. <u>Curriculum: Problem-Solving Rigorous Learning</u>

STEM Curriculum is selected based on Utah Core Standards. The curriculum has an articulated interconnectedness between science, technology, engineering and math. Curriculum and instruction are coordinated between the various aspects of STEM. Projects form a substantial part of the curriculum.

Element	Non-Existent – 0 points	Developing – 1 point	Existing – 2 points	Exemplary – 3 points *(In addition to all "Existing" indicators)*
1g. Cognitively Demanding Work *Students use thinking and process skills. This includes considering alternative arguments or explanations, making predictions, interpreting their experiences, analyzing data, explaining their reasoning, and supporting their conclusions with evidence.*	The school does not include and/or does not have evidence of this element in practice at this time.	Work is in progress to develop this element within the school. This element is included in the school's STEM planning document.	- Student learning products exemplify at DOK 2-3 level at least once a month. Classroom instruction is predominantly student-centered, and all students are asked to extend and refine their acquired knowledge to routinely analyze and solve problems, as well as create unique solutions. - All students are asked to support their conclusions with evidence. Students are asked to explain their reasoning. - All students are asked to consider and/or define alternative explanations.	- Student learning products exemplify at DOK 3-4 level one or more times per month. Classroom instruction is predominantly student-centered, and all students are asked to have the competence to think in complex ways and apply the knowledge and skills they have acquired. Students are asked to create solutions and take action that further develops their skills and knowledge. - All students are asked to support their conclusions with evidence. Students are asked to explain their reasoning. - All students are asked to come up with alternative explanations or arguments. All students are asked to make hypotheses or predictions.

Depth of Knowledge (DOK) is serious business at Neil Armstrong Academy. Students have learned that the process is just as important as the final answer. Students are encouraged to explain their ideas and thinking in all subject areas throughout the day. Multiple solutions are shared and probed and explained in detail. Students are also required to think strategically and to extend their ideas and knowledge through increased rigor and varying levels of question complexity.

STEM areas receive some of the biggest pushes with regards to DOK at Neil Armstrong Academy. Students are required to explain their thinking, support their conclusions with evidence, and discover multiple methods and alternative explanations. Much of this is because of the inquiry method of teaching used in the STEM subject areas. Students are often asked a problem or discuss a situation, and students are tasked with solving problems in any number of ways. Because of this, students are required to explain their ideas and thinking. These discussions are a critical component of much of the work the students take part in. Ideas are shared with the class and students explain their work. The teacher clarifies the thinking, having other students restate and solve problems using these "new" methods. Students are allowed to explore different possibilities and pathways. Students ask questions, and prove, or disprove methods. This collaboration allows for growth and understanding.

With regards to specific examples of DOK levels, there are many. First grade worked on an animal habitat project and had to differentiate between the animals and habitats they live in (Figure 1). Students then had to create the habitats and report on their projects. In a separate project, students in first grade were tasked with constructing bridges out of various materials. The bridges had to be strong enough to an increasing number of pennies. The designs were planned and critiqued throughout the process. Second grade did a lesson on the color of plants. Students investigated why plants are a specific color. Students hypothesized reasons, examined the plans, and made and defended inferences (Figure 2). An example of third grade DOK levels 3 and 4 can be found in student work on hermit crabs and their habitats. Students research the hermit crab and their habitats (Figure 3). Students then created homes for the crabs and compared the activity levels for the crabs to one another. For a fourth grade lesson on soil, students were tasked with researching soil. After several projects on the subject that included collaboration, students were assessed on their knowledge by creating a soil profile in the greenhouse (Figure 4). This was a real world assessment that tied in all the work students had done and was applicable to the real world. Fifth grade pushes level 3 and 4 DOK thinking as well. Once a year, students build valentines boxes that must deliver valentines in various ways using simple machines (Figure 5). Students are free to think about the project in novel ways and design and develop their own solutions. Students move beyond the design phase and construct their ideas. This was a very involved project that forced students to think and rethink various aspects of their projects. They also had to compile lists of materials and develop a series of steps. Sixth grade did something similar to this when they created musical instruments out of garbage (Figure 6). They were shown a video of a town that had no money, but found a creative way to make their own instruments: garbage. Students were then given a set of objectives and were

given the opportunity to create instruments from any garbage they could find. Although they were free in deciding how they could make it, students needed to create instruments that produced a variety of sounds (pitch, tone, etc.). Students critiqued each other's work and had to make modifications to their instruments. This was an assignment that had many iterations and revisions.

Finally, math is one area in which students are regularly asked to explain their thinking, support conclusions, and develop alternative explanations and methods. This process occurs almost daily during both tier 1 and tier 2 instruction for mathematics.

Figure 1. 1st Grade Animal Habitats.

Figure 2. 2nd Grade Leaf Project.

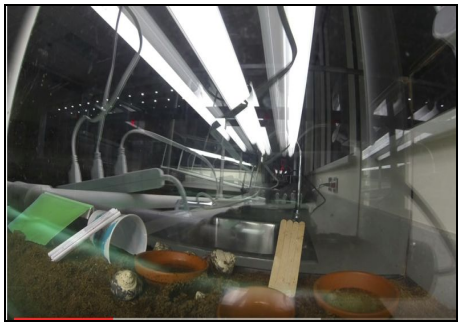


Figure 3. 3rd Grade Hermit Crabs.

Figure 4. 4th Grade Soil Profile.

Figure 5. 5th Grade Valentine's Boxes.

Figure 6. 6th Grade Musical Instruments.

2- Leadership

The school leadership has created clear definitions and a vision of STEM teaching and learning as it applies in the local school and as informed by state, national, and global efforts. Collaboration exists between community, industry and other education partners. Efforts are made to connect to national and global efforts.

Element	Non-Existent – 0 points	Developing – 1 point	Existing – 2 points	Exemplary – 3 points *(In addition to all "Existing" indicators)*
2a. Career Exposure *Students participate in post-secondary education exposure activities, such as college tours, and in career-readiness experiences, including internships and mentoring. In some cases, experiences may be customized for each student.*	The school does not include and/or does not have evidence of this element in practice at this time.	Work is in progress to develop this element within the school. This element is included in the school's STEM planning document.	-Career field experiences are offered to students at least two times per year for authentic learning. -Careers are directly incorporated into the STEM instruction at least once per month. -*Secondary Schools:* Internships or on-site STEM participation exist for some of the students. -*Secondary Schools*: All students participate in job-shadowing, field experiences, or other on-site experiences in STEM fields at least once each year.	- Outside-the-classroom learning includes field experience and authentic, contextual learning that directly connects to the in-class curriculum. - Partners help students and teachers understand what is expected of a student planning to enter a career in the partner's field.

During various points of the school year, students at Neil Armstrong Academy are introduced to various career fields. One of the largest career field programs the school offers and is involved with is Junior Achievement. The goals of the program are to provide students with "work readiness, entrepreneurship and financial literacy through experiential, hands-on programs." These lessons vary from grade to grade, but are meaningful and tied to the real-world. For example, second grade students learned how to run a small business. They were given the opportunity

to be involved with a donut shop. They learned the benefits of specialization, line work, mass production, and other ideas. Second grade students also visited a farm and spoke with various farmhands. They were able to see what sorts of jobs go into running a farm and were able to participate in some of the duties/jobs (Figure 1). First grade paid a visit to a local supermarket and visited with staff members in the bakery, meat department, deli, bulk department, and management. Students were also allowed to use a register, greet customers, and scan products (Figure 2). Third grade runs a program in which various businesses and individuals visit students to discuss their work positions and allow the students to ask questions and partake in various scenarios found at the workplace. Some individuals included, but were not limited to, an architect, cosmetologist, politician, baker, pharmacist, coder, athlete, videographer, and various entrepreneurs (Figures 3 & 4). Finally, fifth grade makes a visit to JA City on a yearly basis. JA City "*is home to over 20 storefronts sponsored by local businesses*." Students "o*perate banks, manage restaurants, vote for a mayor, develop working budgets and manage their business and personal finances.*" Teachers support this opportunity by teaching students how to write checks, create resumes, and take part in job interviews. This opportunity allows students to connect what they learn and what happens in a real world environment (Figures 5 & 6).

Incorporating career field problems with the curriculum is something all teachers at Neil Armstrong do on a regular basis. For example, the sixth grade team worked on creating self-deploying satellites for a space program (Figure 7). The students had to calculate the number of solar panels needed for their satellites based on the size of the satellite. They also had to problem solve how to self deploy the solar panels without a hard release. In another example in the sixth grade, students had to figure out a way to minimize heat loss in a home environment. Students used thermal imaging to determine the amount of heat being lost in their created home models. Students then discovered ways to insulate the homes to prevent heat loss (Figure 8).

Figure 1. 2nd Grade Farming

Figure 4. 3rd Grade Community Visitor.

Figure 7. 6th Grade Self-Deploying Satellites.

Figure 2. 1st Grade working at WinCo.

Figure 5. 5th Grade Job Interview.

Figure 8. 6th grade thermal imaging.

Figure 3. 3rd Grade Community Visitor.

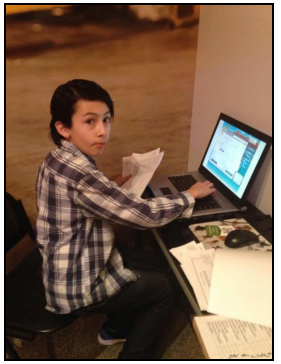


Figure 6. 5th Grade J.A. Biztown Job Experience.

2. **Leadership**

The school leadership has created clear definitions and a vision of STEM teaching and learning as it applies in the local school and as informed by state, national, and global efforts. Collaboration exists between community, industry and other education partners. Efforts are made to connect to national and global efforts.

Element	Non-Existent – 0 points	Developing – 1 point	Existing – 2 points	Exemplary – 3 points *(In addition to all "Existing" indicators)*
2b. College and Career Readiness Skills *Students use the skills of communication, creativity, collaboration, leadership, critical thinking, and technological proficiency.*	The school does not include and/or does not have evidence of this element in practice at this time.	Work is in progress to develop this element within the school. This element is included in the school's STEM planning document.	*STEM lessons/activities require students to exercise skills they will use in the workplace:* - Lessons/activities require students to demonstrate leadership and responsibility. - Lessons/activities require students to present information effectively and are aligned with the Utah ELA standards for communication. - Lessons/activities require students to exercise time management and organize their work. -	*ALL lessons/activities require students to regularly exercise skills they will use in the workplace:* - Lessons/activities require students to demonstrate leadership and responsibility. - Lessons/activities require students to present information effectively, and are aligned with the Utah ELA standards for communication. - Lessons/activities require students to exercise time management and organize their work.

As part of Neil Armstrong Academy's mission statement, the school is committed to have a focus on learning, to have high levels of engagement, and on a problem-solving process that are common to STEM fields to prepare students with the skills that they will need in the future.

Teachers work diligently to create lessons and activities that require students to demonstrate leadership and responsibility. For instance, many teachers have students collaborate in groups and have each member of the group participate in creating an end product to present to their classmates. These lessons range from students conducting research on lightning safety and presenting it to their peers to working out a math problem on their iPad and explain the reasoning behind the way they chose to solve the problem.

Students in fourth grade participate in Kid's Market Place (Figure 1). Kids' Marketplace is a market where students learn business skills by taking on the responsibilities of planning, running, and managing a real life business of their own and realizing the fruits of their labor. Kid's Marketplace fosters youth respect for how hard parents work to provide for them; the realization they can work for themselves; the love of learning business skills which will serve them well professionally and an eagerness to apply and practice their knowledge of math and business skills. Students prepare their business in class, and on Marketplace day, they run their business with the help of parent volunteers while students purchase items from them.

First grade students have created a partnership with a local grocery store. The grade level went on a field trip to this store to learn about jobs in their community (Figure 2). Students were broken up into groups and were able to learn about the different jobs in the grocery store. They were able to be cashiers and scan items that customers were buying. They also worked in the meat department, putting items on the shelves and putting price stickers on the meat. They were also able to work in the bakery and learned how to make some of the baked goods the store sells. When they went back to school they wrote about what they learned in their writing notebooks.

Students in fifth grade work collaboratively in groups to create a digital lightning safety brochure presentation using their iPads and Prezi (Figure 3). They research what lightning is and how it works, what the roles of static and current electricity are in producing lightning, and how people can stay safe during a lightning storm. Students are responsible for using their time wisely, working collaboratively with their partner, and creating a presentation that teaches others about lightning. Students have to use their time wisely because they are given a short time frame to complete the project.

All grade levels have lessons and activities that engage students and encourage them to work collaboratively with each other across many curriculum areas. The lessons that teachers create integrate more than one subject area and are designed to not only cover the core subject areas, but to also teach students leadership and presentation skills, but also time management.

Figure 1. 4th Grade Kid's Marketplace.

Figure 2. 1st Grade WinCo Trip.

Figure 3. 5th Grade Lightning Brochure.

2. **Leadership**

The school leadership has created clear definitions and a vision of STEM teaching and learning as it applies in the local school and as informed by state, national, and global efforts. Collaboration exists between community, industry and other education partners. Efforts are made to connect to national and global efforts.

Element	Non-Existent – 0 points	Developing – 1 point	Existing – 2 points	Exemplary – 3 points *(In addition to all "Existing" indicators)*
2c. STEM Instructional Team Leaders Support Instruction *A portion of school's staff, in addition to administrators, has time designated for instructional leadership and actively supports instruction (e.g., leads professional development, models instruction, gives feedback on instruction, etc.). School leaders ensure that staff members have opportunities to grow in their roles as STEM school teachers and leaders.*	The school does not include and/or does not have evidence of this element in practice at this time.	Work is in progress to develop this element within the school. This element is included in the school's STEM planning document.	- A STEM leadership team is in place to ensure continuous STEM program improvement. - Teacher teams address expectations of school set by the leadership team. - Teams meet regularly to discuss school goals and progress, research, best practices, and opportunities for improvement. - School leaders ensure that teachers have opportunities to see exemplary practice. - Teachers know that it's okay to try new practices. School leaders support teachers when they fail with constructive procedures and feedback. - Utah Effective Teaching Standards and Utah Educational Leadership Standards are **involved in planning**	- A STEM leadership team is in place to define and monitor and evaluate entire school. - Leadership teams meet regularly to discuss research, best practices, successes, and opportunities for improvement toward STEM School goals. - School leaders model instructional practice, **demonstrate and support staff development in high-quality instruction**. - School leaders model and support risk-taking and autonomy for staff. - School leaders model and support staff innovation and/or attempting new strategies. - Utah Effective Teaching Standards and Utah

			and framework for leadership development—see http://www.schools.utah.gov/CURR/educatoreffectiveness/Standards.aspx - School leader(s) encourage and support teachers to seek out additional professional learning opportunities beyond school/LEA.	Educational Leadership Standards are **directly referenced and central to planning, development, and evaluation** of leadership efforts—see http://www.schools.utah.gov/CURR/educatoreffectiveness/Standards.aspx

Neil Armstrong has a leadership team that encompasses many different curriculum areas. Members of the team represent different educational fields and are focused on student achievement (Figure 1). Members of the team consist of Armstrong's administration, and a member that represents each of the core subject areas of science/social studies, math, and language arts. Also represented are advocates from special education, behavior, gifted students, and English language learners. Lastly, there is is member from both the upper grades and the lower grades and one who is focused on data. The team meets monthly to discuss student achievement, as well as a variety of topics ranging from digital portfolios to using a Launch, Explore, Discuss lesson format in teacher's STEM lessons.

The following are the leadership team's expectations:

"View our discussion in light of your assigned role. Be jealously defensive of your corner. Speak up if you disagree. If there are flaws in our thinking or planning, this is a great time to realize it. Make student learning and growth the focus. Be the "rock-solid" foundation for the direction our school goes (mission, vision, values, goals) in spite of inevitable teacher, student, parent, or principal turnover. Be the great Armstrong Idea Factory."

Members of this team model instructional practice to their peers through presenting what was discussed in the meeting to the staff during faculty meetings (Figure 2). Also, Several members of the team model good teaching practices through being on-site facilitators for Comprehensive Math Instruction (CMI) professional development and by teaching math courses to teachers after school hours. All members of

the team use effective teaching standards and educational leadership standards when presenting or modeling instruction to their fellow faculty members. As part of the Armstrong Collective Commitment, the team encourages staff members to try, fail, and try again when attempting to be innovative and to try new strategies.

The agenda for each meeting is housed in Evernote and assists in monitoring and evaluating the school's progress. During the monthly meetings the team members discuss research, best practices, successes, and opportunities for improvement toward the school's STEM School goals, analyze data gathered to measure progress (Figure 3). The meetings start off with reviewing what was discussed during the previous meeting and what progress is being made to meet certain goals. Next, new agenda items are researched, discussed and data is analyzed. Once the meeting is complete assignments are given out for presenting to faculty meeting and some are adopted for discussion during grade level PLC meeting.

School Leadership Team

Neil Armstrong Academy
2015-2016

Role	Name
Administration	Matt Goebel/Kent Nixon
Language Arts	Cyrus Moulder
Math	Laura Passey
Science/Social Studies	Jan Rolan
Behavior	Sara Dillon
ALP Lead/ESL	Mysti Hedquist
Data	Becky Mott
Upper Grade Teacher	John Paul Sorensen
Lower Grade Teacher	Kristine Johansen
Gifted and Talented	Jen Bodell
Resource	Kaylin Lythall

Figure 1. Armstrong School Leadership Team.

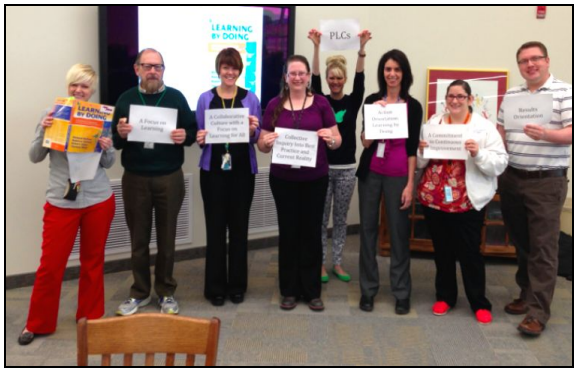


Figure 2. Armstrong Leadership team modeling good teaching and leadership practices during faculty meeting.

Leadership Team for October 22, 2015

Report Spam

Updated Oct 22nd, 2015

Leadership Team Expectations:

- View our discussion in light of your assigned role. Be jealously defensive of your corner.
- Speak up if you disagree. If there are flaws in our thinking or planning, this is a great time to realize it.
- Make student learning and growth the focus.
- Be the "rock-solid" foundation for the direction our school goes (mission, vision, values, goals) in spite of inevitable teacher, student, parent, or principal turnover.
- Be the great Armstrong Idea Factory

Agenda:

- Digital Portfolios. Where to go next?
  - Evernote
  - Google Drive
    - Can the younger grades use it?
- 2015-2016 Goals Brainstorm
  - SMART Goals:
    - Specific
    - Measureable
    - Attainable
    - Results-oriented
    - Time-bound
  - Brainstorm:
    - Reading fluency goal
    - Standards-based tracking in two subjects (Language Arts?)
    - CMI - Launch/Explore/Discuss
    - Vertical articulation

Figure 3. Example of Leadership Team Agenda.

2. Leadership

The school leadership has created clear definitions and a vision of STEM teaching and learning as it applies in the local school and as informed by state, national, and global efforts. Collaboration exists between community, industry and other education partners. Efforts are made to connect to national and global efforts.

Element	Non-Existent – 0 points	Developing – 1 point	Existing – 2 points	Exemplary – 3 points *(In addition to all "Existing" indicators)*
2d. Staff Has Sense of School Ownership and Participates in Decision Making *Staff members behave in a manner that exhibits their responsibility for and commitment to the success of the school. The staff contributes to and has a say in decisions regarding the school. The staff works with independence and self-direction.*	The school does not include and/or does not have evidence of this element in practice at this time.	Work is in progress to develop this element within the school. This element is included in the school's STEM planning document.	- The school leadership engages staff in strategic planning. - The school leadership has an articulated process for staff to give input and feedback. - Decisions are made by greater than 50% of the school's staff.	- The school leadership engages ALL staff members in strategic planning. - The school leadership has an articulated process for staff members to give input and feedback, and responds to feedback in an open setting. - Decisions are made by ALL school faculty and staff members.

Neil Armstrong has several layers of leadership and an articulated, systematic process for feedback. We are a PLC school, and as such, leadership really starts at the grade level team where teachers are empowered to make decisions about what they teach, when they will teach it,

how they will assess student growth towards the core standards, how they will respond when are not making growth, and how they will extend teaching when students already understand the concepts being taught (Figure 1). Each team fills out a form as they meet in collaborative groups (Figure 2). The form provides the school and the team with feedback regarding our PLC activities and challenges faced. At Neil Armstrong, PLCs are the foundation of school leadership, and when one team finds something that will enhance the environment and learning of other grades, this information is expected to be shared with the rest of the teams.

Neil Armstrong's leadership team consisting of Armstrong's administration, and a member that represents each of the core subject areas of science/social studies, math, and language arts, special education, behavior, gifted students, and English language learners and lastly a member from both the upper grades and the lower grades meet monthly. They meet to discuss data, the directions of the school, goals, innovations, and systemic and programmatic changes to improve the capacity of the the teachers, teams, and school. It provides an excellent opportunity for school leadership to discuss various aspects of the school and receive feedback on the many programs and initiatives at the school.

All member of the faculty are welcome at these meetings to observe or provide input. Often they send their ideas and feedback with members of the team. The meetings are scheduled regularly throughout the year to provide a continuity to the conversation. Additionally efforts have been made to foster a culture of openness. Openness to new ideas and openness to thoughts that our old ideas might not be getting the results we want. This began with the school first principal Tyler Howe who was passionate about his own ideas and even more passionate about the great ideas of others. His passion created a synergistic environment where thinking inside and outside of the box was welcomed.

The following chart (Figure 3) from a survey of faculty members in fall of 2015 illustrates how teachers feel about the environment for collaboration at Neil Armstrong. This gave an opportunity for all teachers to communicate their feelings on the idea of communication. As indicated in the chart, the teachers feel very comfortable providing feedback to all aspects of the goings on in the school. Leadership team meets monthly to discuss various topics openly. The environment for these discussions is always one of openness and safety. The matters discussed in leadership are then discussed in staff meeting. Again, this environment is open and all are encouraged to discuss, as is indicated in the following chart.

Figure 1. Members of the 4th grade team meeting during one of their three weekly collaboration times.

Figure 2. The Granite School District Working Together PLC form used to provide data and feedback about the school PLCs.

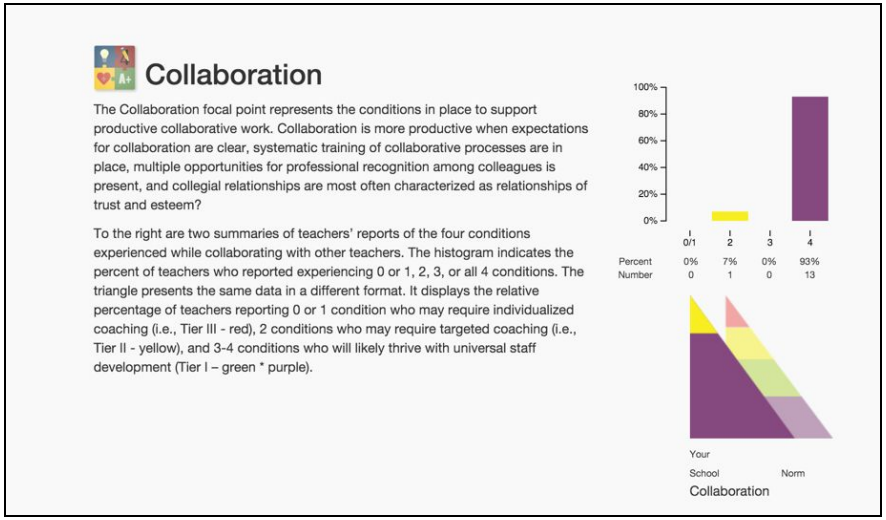


Figure 3. Results from 2015 teacher survey on collaboration.

3. **Assessment**

Assessments are ongoing, authentic and cross-curricular. They are project-focused and performance-based. Rubrics for projects are provided and articulate with the goals of the assessment. Formative assessment informs summative assessment and teaching efforts.

Element	Non-Existent – 0 points	Developing – 1 point	Existing – 2 points	Exemplary – 3 points *(In addition to all "Existing" indicators)*
3a. Student Learning Outcomes (SLOs) Process *Demonstration that school utilizes SLO process to measure student outcomes and teacher instruction.*	The school does not include and/or does not have evidence of this element in practice at this time.	Work is in progress to develop this element within the school. This element is included in the school's STEM planning document.	- STEM courses utilize SLOs to measure progress toward targets for at least two expected student learning outcomes. - Students are actively informed about mastery expectations and progress.	- 80% of courses utilize SLOs to measure progress toward targets for at least two expected student learning outcomes. - Qualitative assessments exist around student learning outcomes.

All grade levels work collaboratively to identify essential learning outcomes from the Utah Core Standards and to prioritize those standards based on their students' learning needs. We've begun a shift in our grading scheme to align more appropriately with Student Learning Outcomes (SLOs) and mastery-based learning rather than simple work/project completion. Teacher teams and students utilize a By-the-Student-By-the-Standard Mastery Tracker to evaluate student mastery on the essential Student Learning Outcomes (Figure 1). Each essential learning standard is listed. Teachers work to develop Common Formative Assessments (CFAs) that can be administered to all students in the grade level to measure mastery on the standards. Students who achieve a level of proficiency on those standards mark it off on their Mastery Tracker. The left side of the tracker shows a thermometer-type scale of what percentage of the standards the student has mastered at any given point.

All teachers are using the By-the-Student-by-the-Standard Mastery Tracker with at least two subject areas with plans to continue adding a subject each additional year.

In addition to the Common Formative Assessments developed and utilized by teachers, Armstrong teachers use district-generated benchmarks in math and language arts to compare student learning growth of the standards against those of other schools in the district. Google Classroom, Utah Compose, SAGE Formative testing items, and a school-wide review tournament contribute to our focus on student-learning outcomes (see Figure 2).

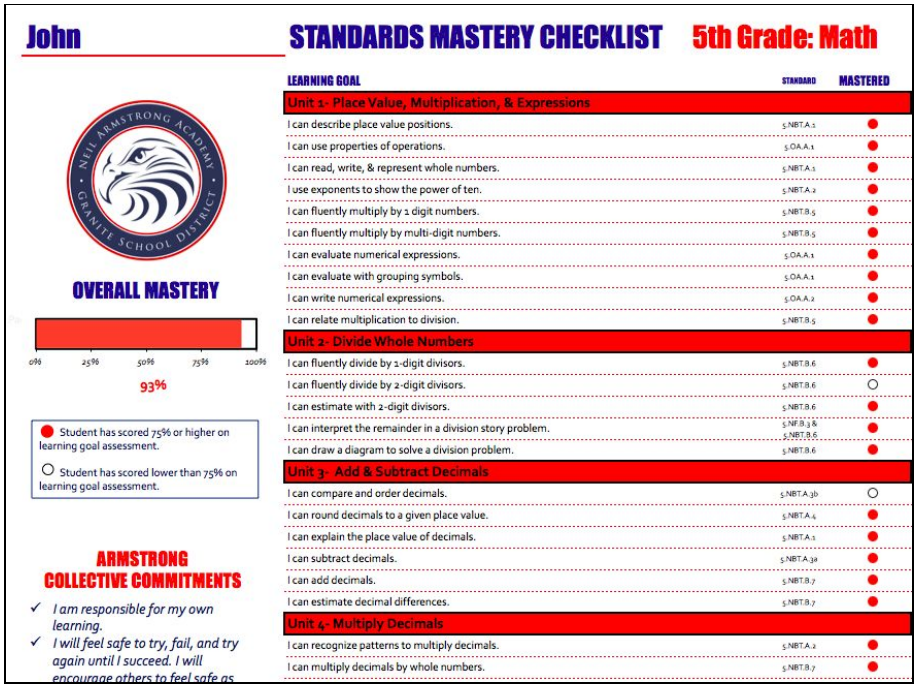


Figure 1. Student By The Standard Mastery Tracker.

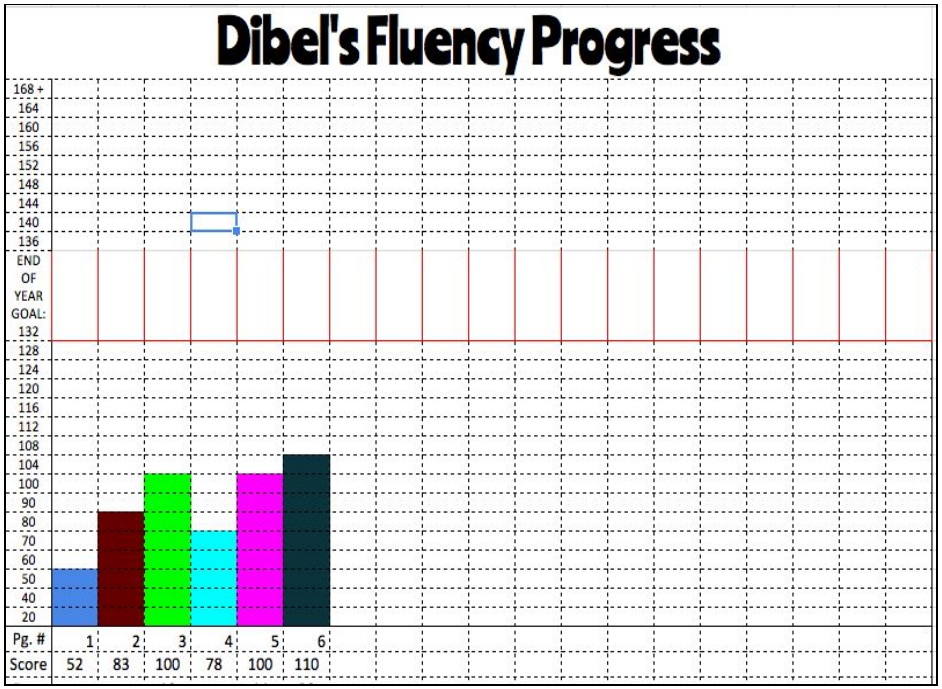


Figure 2. Sample of Student Data Tracking in Google Classroom.

3. **Assessment**

Assessments are ongoing, authentic and cross-curricular. They are project-focused and performance-based. Rubrics for projects are provided and articulate with the goals of the assessment. Formative assessment informs summative assessment and teaching efforts.

Element	Non-Existent – 0 points	Developing – 1 point	Existing – 2 points	Exemplary – 3 points *(In addition to all "Existing" indicators)*
3b. Use of Assessment to Inform Instruction *The teacher uses information on current student understanding to inform and plan future instruction.*	The school does not include and/or does not have evidence of this element in practice at this time.	Work is in progress to develop this element within the school. This element is included in the school's STEM planning document.	- All teachers use multiple indicators of success (e.g., performance assessments, observations, monitoring student dialogue) at least once a week to inform their decisions about instruction (reteach concepts, try an alternative instructional strategy, organize the students differently, provide an alternative example). - Most teachers go back and reteach concepts based on student understanding. - Teachers consistently use observation and monitor student dialogue to assess student learning.	- All teachers use multiple indicators of success (e.g., performance assessments, observations, monitoring student dialogue) almost every class session to inform decisions about instruction (e.g., reteach concepts, try an alternative instructional strategy, organize the students differently, provide an alternative example). - Teachers use observation and monitor student dialogue to consistently assess student learning, and share their data in teacher teams at least once a month.

Armstrong teachers are focused on student-mastery outcomes. We are committed to a culture that emphasizes students learning the essential standards no matter how much we must adjust time, scope, and sequence to meet that goal. To measure student learning, Armstrong teachers use a variety of tools. Among the most powerful of these are our teacher-created Common Formative Assessments run by the Google Flubaroo platform (Figure 1).

Teachers use this platform to create multiple-choice, matching, short answer, or essay questions that can be easily distributed to all students in the grade level. The results of the Flubaroo assessment are stored collectively, regardless of class or teacher, in a spreadsheet that allows them to be easily graded and compared. Using the regular data from these Google Flubaroo Common Formative Assessments, students are fluidly regrouped to meet intervention and enrichment needs on a daily basis (Figure 2). A student who demonstrates he can't multiply or divide whole numbers on Friday will immediately be working with a group of kids in his grade level who also struggle with that concept on Monday. Likewise, a student who demonstrates he has mastered multiplying and dividing whole numbers on Friday will find himself working with an enrichment group on that same topic on Monday. This structure demonstrates to students our commitment to supporting their learning needs using the data they help provide.

Small group work takes place daily in all classrooms and within all grade levels. In addition to the small group work teachers do with their own students during a language rotation, teachers also rotate students during Flex Time. This rotation takes place four days a week and is determined by student achievement data on common formative assessments, district benchmark assessments, and in everyday work students take part in. These rotations cover mathematics and language instruction and are designed to either intervene and provide instruction to those who have yet to master a standard or provide extensions to those who have.

All assessment groups and small group decisions are based on data using a wide range of measurements. Neil Armstrong Academy teachers have been given numerous tools to help their instruction and make informed decisions. These include, but are not limited to, Go Math, DIBELS, Utah Compose, Imagine It!, common formative assessments, and Granite School District Benchmarks. All are assessments or feature assessments that teachers use often with their classes. Teachers are then able to pull relevant date, that is tied to curriculum and research based, to make informed decisions to improve the instructional opportunities for their students. As mentioned previously, students at Armstrong rotate four days a week during Flex Time. It is the aforementioned assessments that provide the data to teachers.

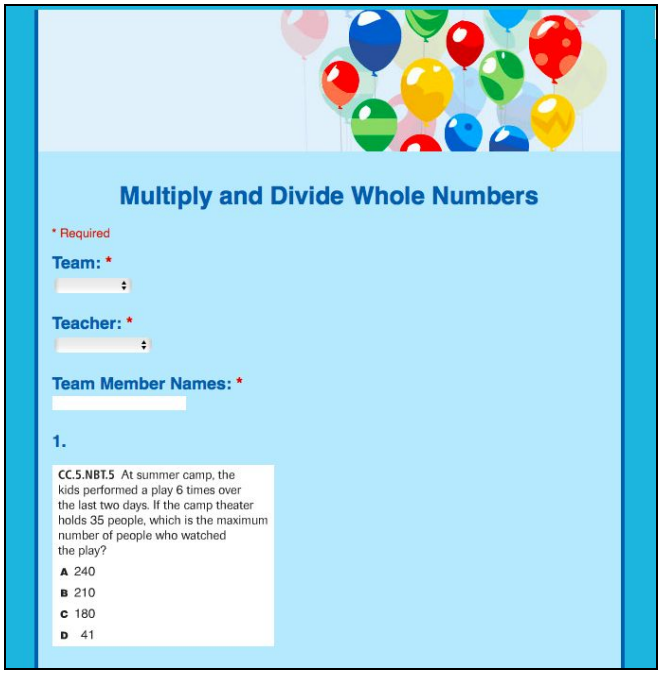


Figure 1. Example of a Common Formative Assessment using Google Forms.

Summary:							
Points Possible	10						
Average Points	8.75						
Counted Submissions	69						
Number of Low Scoring Questions	0						
Submission Time	**First Name**	**Last Name**	**Teacher**	**Email**	**Total Points**	**Percent**	**Times Submitted**
10/24/2014	Charles	Adair	Larsen	CharAdai9575@graniteschools.org	10	100.00%	1
10/24/2014	Nala	Alexander	Marsing		8	80.00%	1
10/24/2014	Connor	Anderson	Larsen	drcon08@gmail.com	10	100.00%	1
10/24/2014	Savana	Anderson	Sorensen	savaande9592@graniteschools.org	10	100.00%	1
10/29/2014	Pharell	Ausby	Sorensen	Pharausb9628@graniteschools.org	10	100.00%	2
10/24/2014	John	Doe	Marsing		6	60.00%	1
10/24/2014	Ethan	Biddulph	Larsen		10	100.00%	1
10/24/2014	Alexa	Birdsall	Sorensen		6	60.00%	1
10/24/2014	Sebastian	Bodero	Larsen	sebabode9522@graniteschools.org	9	90.00%	1
10/24/2014	Jarett	Burdett	Marsing		10	100.00%	1
10/24/2014	Mallory	Caldwell	Marsing		7	70.00%	1
10/24/2014	Kylee	Chadwick	Larsen	Kylechad	10	100.00%	1
10/24/2014	Dakotah	Chaplow	Sorensen	dakochap9579@graniteschools.org	9	90.00%	1
10/24/2014	Jayson	Chase	Sorensen	Jayschas9562@graniteschools.org	9	90.00%	1
10/24/2014	Olivia	Clark	Sorensen	Olivclar 9564@grantieschools.org	9	90.00%	1
10/24/2014	Jennalee	Clawson	Marsing		10	100.00%	1
10/24/2014	Ricardo	Cornejo	Sorensen	ricacorn9561@graniteschools.org	10	100.00%	1

Figure 2. Example of Data gathered using Google Forms and the Flubaroo Platform.

4. **Professional Learning**

STEM-focused professional learning is fully implemented. Professional development aligns with Utah's requirements for professional learning (Utah Code 53A-3-701) and aligns with Utah Core Standards and Utah Effective Teaching Standards. Learning communities and learning networks are integrated into efforts for personal growth and school wide growth.

Element	Non-Existent – 0 points	Developing – 1 point	Existing – 2 points	Exemplary – 3 points *(In addition to all "Existing" indicators)*
4a. Staff Engagement in Relevant Professional Learning Opportunities *The staff participates in internal or external growth and development activities that are beneficial and relevant to their work. Staff members are willing to try new practices and adjust what they do for the greatest benefit for students.*	The school does not include and/or does not have evidence of this element in practice at this time.	Work is in progress to develop this element within the school. This element is included in the school's STEM planning document.	- Professional development meets **ALL** of the criteria established in Professional Learning Standards articulated in Utah law 53A-3-701 passed in 2014 http://le.utah.gov/~code/TITLE53A/htm/53 A03_070100.htm - School leader(s) make sure teachers have access to STEM professional learning at least once per school year. - Staff members occasionally try new strategies (e.g., instructional, management, stakeholder outreach). - Staff members have clear opportunities to give input about professional development needs and outcomes received at the school.	- Professional development meets **ALL** of the criteria established in Professional Learning Standards articulated in Utah Code 53A-3-701, passed in 2014 http://le.utah.gov/~code/TITLE53A/htm/53 A03_070100.htm - School leader(s) make sure teachers participate in professional learning at least once per month. - Staff members regularly try new strategies (e.g., instructional, management, stakeholder outreach). Some PD experiences or staff collaboration time are structured to focus on new practices.

At Neil Armstrong Academy we are committed to a focus on learning, high levels of engagement, and a problem-solving process common to the science, technology, engineering, and math (STEM) fields to prepare all students with the skills they will need for their future. To follow the school mission, Armstrong has implemented and participated in several staff professional development opportunities to assist teachers and staff members to learn how to prepare effective lessons that are focused in the STEM areas. Over the past three years Armstrong teachers have attended Teachers Increasing Learning Through Technology (TILT), Physical Science Inquiry Academy (PSIA), and Comprehensive Math Instruction (CMI) trainings. These professional development opportunities occur weekly and monthly and are focused on new and innovative teaching practices.

Teacher Increasing Learning Through Technology is a training provided by the Educational Technology Department of Granite School District. The objective of TILT is to Enhance teacher instructional practices by using technology seamlessly in classrooms. It also has an emphasis on project-based learning, constructivist approaches, and student-centered classrooms (Figure 1). It also is designed to enrich instructional effectiveness and increase student academic achievement. All teachers on staff attended these trainings every two weeks for one school year, during the first year of the program. Staff members who attended the training during its second year obtained a technology endorsement through Southern Utah University and the Utah State Office of Education.

Teachers who attended Physical Science Inquiry Academy attended the trainings once a month and were trained on how to implement the Utah State Science Standards into their classrooms in ways that are hands-on and engaging (Figure 2). This training was provided by Granite School District in partnership with the University of Utah. Teachers learned how to create effective, organized science notebooks based on lessons that walked students through the scientific process and provided structure for inquiry learning. PSIA training occurred once a month and teachers that attend recieved essential science tools and supplies to assist with implementing the BSCS Inquiry Model into their classrooms.

Comprehensive Math Instruction (CMI) is a professional development training through a partnership with Brigham Young University that teachers attend twice a month (Figure 3). CMI is designed to help teachers approach math instruction from a different perspective. The framework consists of three different components: the teaching cycle, the learning cycle, and the continuum of mathematical understanding. The CMI framework's purpose is to deepen students' mathematical understanding by strengthening teachers instructional practices. Teachers learn how to build and implement complex mathematical tasks for students by utilizing a launch, explore, discuss learning cycle. This form of professional development is built into the teacher's contract schedule and occurs every two weeks for the whole school year.

In addition to these professional development experiences, teachers attend technology and STEM conferences, Close Reading trainings, additional mathematics courses, and participate in various endorsement programs and that are designed on different areas of STEM. Teachers at

Armstrong are dedicated to learning effective teaching styles and practices to assist with creating effective engaging inquiry based learning experiences to increase student learning and achievement.

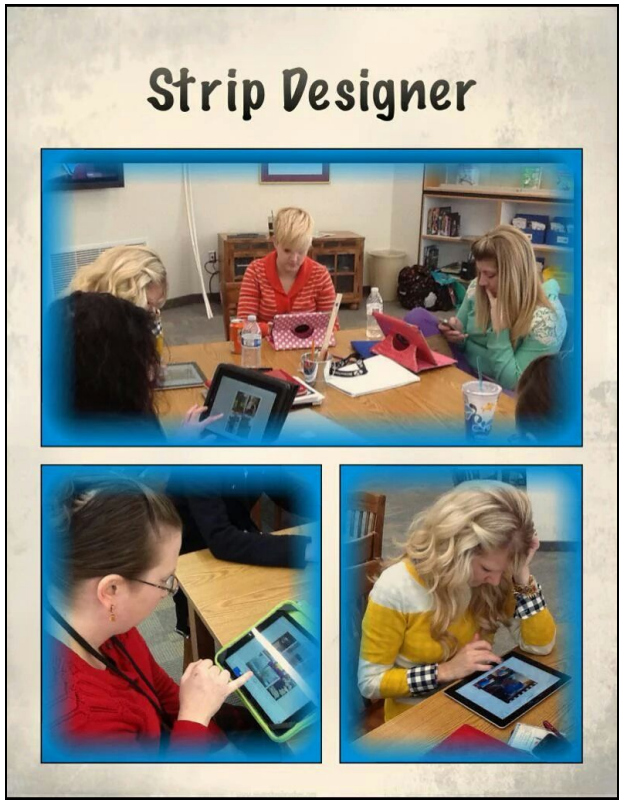


Figure 1. Teacher learning how to use the Strip Design app during a TILT Training.

Figure 2. Teachers investigating electricity during Physical Science Inquiry Academy.

Figure 3. Teachers attending Comprehensive Math Instruction Training.

4. **Professional Learning**

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Element	Non-Existent – 0 points	Developing – 1 point	Existing – 2 points	Exemplary – 3 points *(In addition to all "Existing" indicators)*
4b. Professional Development Resources *Resources (both time and funding) are available to help teachers and staff develop and further their skills.*	The school does not include and/or does not have evidence of this element in practice at this time.	Work is in progress to develop this element within the school. This element is included in the school's STEM planning document.	- School leadership ensures that professional development opportunities are identified and shared. - School leadership makes sure that professional development is high quality. - School leadership supports staff interests in STEM professional learning. - Leaders designate financial and human resources to support staff professional development.	- The leadership obtains grant(s) and/or brings in resources beyond school funding streams to support professional development. - Leaders evaluate the impact of professional development.

In collaboration with the School Community Council, Armstrong Academy allocated $37,338 from school LAND trust monies to pay for substitute teachers to cover classes while an expert from Brigham Young University worked with teachers on Comprehensive Mathematics Instruction. Comprehensive Mathematics Instruction (CMI) is a research-based method of teaching mathematics with a new lens. CMI focuses on approaching the teaching and learning of mathematics with a launch, explore, discuss learning cycle that encourages students to complete complex mathematical tasks. Sterling C. Hilton, Department of Educational Leadership and Foundations, Brigham Young University, visits Armstrong Academy once a month. The school has dedicated $2,000 to pay for Dr. Hilton's facilitation of CMI professional development during the

professional day. In addition, two teacher leaders have been trained to assist with the professional development as well as the principal, Matt Goebel. Dr. Hilton works closely with Principal Goebel to ensure teachers are supported in their professional development, and counsels as to how teacher observations and feedback can align with the school's CMI training goals. Teachers at Armstrong will participate in CMI training for two years, and the program will be evaluated upon completion.

In addition to Comprehensive Mathematics Instruction, three teachers are currently enrolled in courses to obtain their STEM endorsement through the University of Utah, in partnership with a grant from Utah's STEM Action Resource Center.

Because Armstrong Academy has a daily schedule that allows for teacher collaboration in a professional learning community three times per week, the development and learning the teachers are obtaining is readily shared and discussed. Armstrong teachers are committed to increasing student achievement and are continuously discussing student data to determine if their newly learned instructional strategies have been effective. Armstrong's school improvement goal and area of focus is to increase the percentage of students reading on grade level in grades 1 - 3, from 64% in January 2015 to 75% in May 2016. Additionally, we will increase our school-wide SAGE proficiency results from 49.2% in May 2014 in Language Arts to 60%, from 56.9% to 65% in mathematics, and 53.3% to 62% in science by May 2016.

4. **Professional Learning**

STEM-focused professional learning is fully implemented. Professional development aligns with Utah's requirements for professional learning (Utah Code 53A-3-701) and aligns with Utah Core Standards and Utah Effective Teaching Standards. Learning communities and learning networks are integrated into efforts for personal growth and school wide growth.

Element	Non-Existent – 0 points	Developing – 1 point	Existing – 2 points	Exemplary – 3 points *(In addition to all "Existing" indicators)*
4c. Staff Reflects On Their Work *The staff considers the strengths and weaknesses of their practices and ways they can improve.*	The school does not include and/or does not have evidence of this element in practice at this time.	Work is in progress to develop this element within the school. This element is included in the school's STEM planning document.	- Staff members explicitly identify times to consider the strengths and weaknesses of their work. - Staff members document monthly reflections about how to improve their work.	- Staff members develop strategies for improving their work in collaboration with colleagues and administration. - Staff members document weekly reflections about how to improve their work.

Professional learning is, and has been, a fundamental idea at Neil Armstrong Academy. All staff members at Neil Armstrong Academy fully understand the importance that professional learning plays in both the professional growth of the individual, and its immediate effect on the student.

Utah Code 53A-3-701 states that professional learning is a comprehensive, sustained, and evidence-based approach to improving teachers' and principals effectiveness in raising student achievement. Staff members at Neil Armstrong Academy have completed several professional learning courses to master various content skills, teaching practices, and collaboration methods . This is evident in several ways. First, teachers at the academy are currently enrolled in, or have recently completed content related courses. These include, but are not limited to, master's degrees in the fields of language, mathematics, and technology, and teacher leadership and policy, as well as endorsements related to English as a Second language, technology, mathematics, and reading, and individual classes covering a wide range of topics. Educators at Neil Armstrong Academy understand that implementation of the material covered in these classes and courses directly benefit students. Teachers have bought into the idea

of trying new things, sharing results, and tweaking lessons. Data is regularly kept and is shared with many. The data is analyzed using a district developed set of questions that cover the areas of content, student evidence, tier 1 instruction, interventions, and extensions. The professional learning in this area has been quite effective and is evident in student achievement growth.

Educators at Neil Armstrong Academy are dedicated to the growth of all individuals, including co-workers. Teachers regularly share theories, research, and instructional models with fellow teachers and parents. The staff at the academy have become very comfortable with recording lessons and sharing them; many post these lessons online to share with parents and other stakeholders. Educators at the academy have certainly built a shared culture that impacts the school and larger educational community, all of which can be found in Standard 9 of the Utah Effective Teaching Standards.

Goals are an integral part of the work that goes on at Neil Armstrong Academy. Teachers set individual and team goals with administrators, coaches, and each other throughout the school year. Goals include, but are not limited to, PG&E goals (Figure 1 & 2), reading goals for students based on beginning of Year DIBELS benchmark data, grade level goals that are set during collaborative meetings based on common formative assessments and student performance as measured by student progression, goals set as both individuals and teams with the literacy coach, and math instructional goals set through the Comprehensive Mathematics Instructional framework, all of which is consistent with Standard 8 of the Utah Effective Teaching Standards. Educators also reflect on these goals throughout the year with team members, coaches, and administrators to determine successes, needs for improvement, and to set and/or modify new and existing goals.

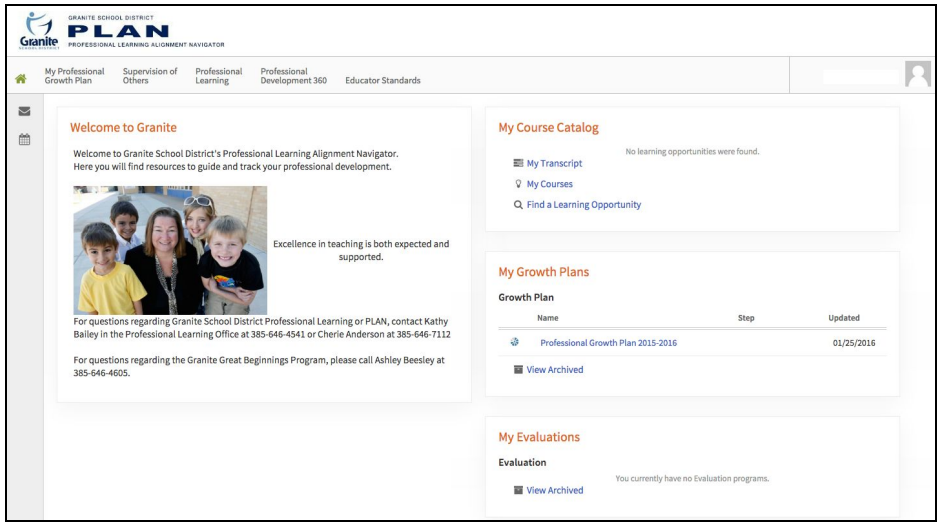


Figure 1. Example of PG&E Platform.

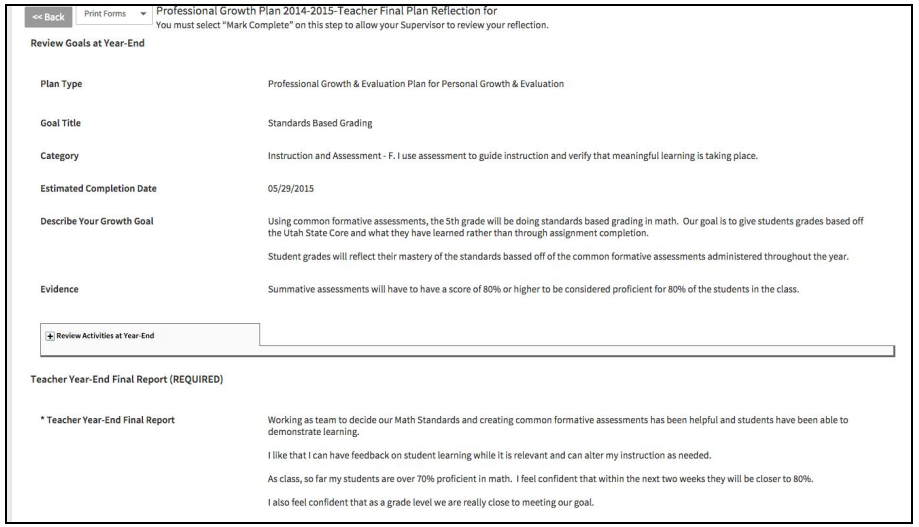


Figure 2. Example of teacher reflection on the PG&E Platform.

5. **Teaching**

Teaching is conducted with a focus on STEM concepts, processes and thinking. Teachers coordinate lessons, ideas and planning among one another with a mechanism in place for doing so in both formal and informal ways. Incentives exist for supporting one another. Correlations among various aspects of STEM are articulated and explicit. The faculty demonstrates content competency in all areas of STEM and have relevant endorsements. Efforts are made to support content sharing.

Element	Non-Existent – 0 points	Developing – 1 point	Existing – 2 points	Exemplary – 3 points *(In addition to all "Existing" indicators)*
5a. Code of Behavior and Values *The staff emphasizes and demonstrates code of behavior and values for themselves and students. The staff listens to, supports, and engages constructively with colleagues.*	The school does not include and/or does not have evidence of this element in practice at this time.	Work is in progress to develop this element within the school. This element is included in the school's STEM planning document.	- The student handbook articulates a code of behavior, values, and treatment of one another with trust and respect. - The code is visibly displayed. - Staff and students talk about the code of behavior and values in classes.	- Staff and students talk about it in and outside of class (in hallways and after school activities). - Students use and are assessed on core values in their learning. - A program for recognition of student conduct exists. - STEM career behaviors and skills are embedded into the code of behavior and values.

Neil Armstrong Academy has high expectations for its students' academic and behavioral achievements. It is believed that such expectations will only be achieved through combined efforts and cooperation of students, teachers, and parents. Armstrong's primary goals are to keep students safe and to maximize student learning. The school believes that these goals will only be achieved as each party understands the behavior that is expected of them. Armstrong has three behavior expectations: Keep your hands, feet, and other objects to yourself; be on task, and be respectful. These behavior expectations vary with time, location, and situation, and are expected at all times and are instrumental in achieving Armstrong's goals for safety and student learning. The expectations are displayed throughout the building on posters and are tailored to expectations for each location with a reminder of what it looks like and sounds like description as a reminder to students (Figure 1). Students are also taught the expectations during 'Armstrong in Action' assemblies at the beginning of each school year and revisited by the school's student

council who demonstrate the proper way to behave in each location in a segment of the schools ABC News program that broadcasts every Monday morning. Neil Armstrong Academy believes that if students can follow these expectations, then they will be successful in working collaboratively in a STEM career.

Armstrong Academy promotes positive, school-wide behavior, hard effort and achievement. Students are continuously recognized for their accomplishments, effort, and appropriate behavior. Within our positive school-wide framework, there are several opportunities for students to be recognized. Here are just a few of these special opportunities:

- Gratitude Grams (Figure 2) – Individual students can earn Gratitude Grams for following the school rules, exhibiting positive values in their daily behavior, and for overall school effort. After students have collected the designated number of Gratitude Grams, they may turn them in at the office for a special reward. All Gratitude Grams are kept and entered into a drawing at the end of the year for additional prizes. All staff members carry around Gratitude Grams and pass them out to students who are demonstrating the proper expectations in various areas of the school.
- Moon Bucks (Figure 3) – Classes "caught" following the school rules can earn Moon Bucks from any of the school staff. Moon Bucks are cashed-in to purchase special class activities or prizes hosted by the school. Moon Bucks are housed through the Armstrong Academy website and staff members recognize whole classes for having amazing behavior in the hallway, at lunch, during assemblies, etc. There is a live graphic on the Armstrong website that shows how many moonbucks each class has.
- Top Student (Figure 4) – One child per class is selected each week as the Top Student. These students will be announced to the student body and eat lunch at the special Top-Eagle table with the principal. Each teacher nominates a student and writes a description of why their student was nominated to Top Eagle Lunch. The students are then recognized in front of their peers, and what the student's teacher wrote about the student gets posted in the weekly Above and Beyond newsletters that are sent to parents and on the school's website.
- Classroom and Grade Level Recognition and Activities (Figure 5) – Teachers and grade-level teams design recognition programs for their students within the school-wide framework of positive behavior management. These vary by teacher and grade level.
- Student and Teacher of the Month (Figure 6) – Each month one student per grade level is nominated by their classroom teacher for Eagle of the Month (outstanding citizen and academic achievement). Separately, teachers also recognized for their dedication and hard work. Both students and teachers are celebrated during a school assembly. They are also recognized on the school website and Above and Beyond newsletter.

Figure 1. Behavior Expectation Posters.

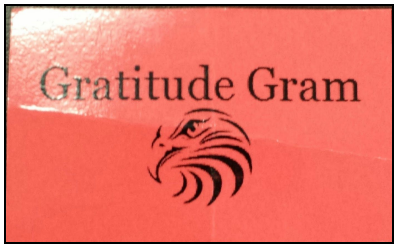


Figure 2. Gratitude Gram example.

Figure 3. Moon Buck example.

Figure 4. Top Eagle Lunch.

Figure 5. Grade Level Achievement

Figure 6. Student of the Month

5. **Teaching**

Teaching is conducted with a focus on STEM concepts, processes and thinking. Teachers coordinate lessons, ideas and planning among one another with a mechanism in place for doing so in both formal and informal ways. Incentives exist for supporting one another. Correlations among various aspects of STEM are articulated and explicit. The faculty demonstrates content competency in all areas of STEM and have relevant endorsements. Efforts are made to support content sharing.

Element	Non-Existent – 0 points	Developing – 1 point	Existing – 2 points	Exemplary – 3 points *(In addition to all "Existing" indicators)*
5b. Teacher Differentiation of Instruction Based on Learning Needs *The teacher customizes instruction based on abilities, learning styles, and developmental levels of the students.*	The school does not include and/or does not have evidence of this element in practice at this time.	Work is in progress to develop this element within the school. This element is included in the school's STEM planning document.	- Course pacing of content covered is modified to accommodate for differences among students. - Teachers ensure that rigor is maintained while making lessons accessible for all students. - Teachers adapts curriculum to better fit student learning styles. - Teachers use a range of pedagogical strategies.	- Teacher differentiation incorporates students' real-life applications for outside learning. - Students are able to self-select the differentiation. - Teachers regularly and systematically share information about students' learning differences.

Although the goal for all students at Neil Armstrong Academy is mastery of all content objectives, how they get there may vary greatly from student to student. The staff at the academy recognizes these paths and allow students to grow and engage in lessons through differentiation and by using a range of teaching strategies.

Differentiation takes place in three ways: content, process, and product. Teachers at the academy differentiate content in the way it is delivered and in varying depth of knowledge (DOK) levels. Often, lessons are delivered through a mix of visual, aural, verbal, social, and logical learning. This mix allows students who favor one style over another to access content in meaningful ways. For example, the third grade required students to track data, collaborate in teams, write reports, and share information as they explored the pressure of rubber bands on a pumpkin (Figure 1). The sixth grade team had students engineer Greek temples during a civilization unit (Figure 2). Students were free to research Greek history as they saw fit: books, videos, discussions, etc. Students were also required to develop presentations and create a physical representation of their temple. These temples allowed students to not only engage in information in a variety of ways, it also allowed the students to self-select the content, process, and product.

Adjusting the DOK level is another way that teachers differentiate the content, process, and product for students. With regards to content, depth of knowledge levels are adjusted to allow the students to access the content within their instructional zone. Teachers use varied Bloom's Levels to move students from basic memorization towards evaluating and synthesizing information. The continual rigor places higher cognitive demands on the student and allows them to achieve true mastery of the identified standards. This also changes the way students process information. Teachers at the academy often use socializing techniques (think-pair-share, etc.), journaling, small group work, and many other strategies to provide differentiated processing. Products are also adjusted to provide another level of differentiation. Often, students are able to self-select various products in which they are able to demonstrate understanding or mastery of a subject or objective. The following third grade lesson is an example of how DOK level and differentiation are implemented in a social studies unit. Students were tasked with learning about various climates and the cultures that inhabit various habitats. The third grade staff identified the essential standard that all students would need to master by the end of the unit. These standards were shared with students and individual classes explored the tundra: people living there, the climate, etc. Having worked on the basic idea together, students then moved into small groups. The small groups were able to self-select climates and level readers were handed out to students. The groups of students explored their habits, gathered important information, filled out a graphic organizer, and determined what information would be shared with the class. Students were free to watch videos, draw pictures, and use any number of apps on their smart devices. Ultimately, students presented the information and demonstrated mastery in a self-selected way. DOK levels were adjusted for content, the process, and the product.

Small group instruction is another way in which teachers differentiate student learning. Having taught content during Tier 1 instruction, teachers administer common formative assessments. The goal of these assessments is to provide staff with information on student mastery of content on varying levels of rigor. Teachers meet three days a week to discuss student progress with one another, the administration, and other stakeholders. Small group rotations are created based on need and students attend a class that is focused on a specific skill and rigor for mathematics or language. Lower achieving students are able to focus on mastering core concepts, many of which are prerequisite to future skills.

Higher achieving students are able to extend their knowledge and truly focus on the higher levels of rigor. In both cases, the staff at the academy use a variety of teaching strategies to engage their students. Many classes use Plickers to quickly assess their students. Interdisciplinary teaching allows the staff to target more than one subject at a time while meeting with their small groups. Finally, many classes at Neil Armstrong use games, experiments, and simulations to vary the instruction and master the content in different ways. The interconnected small groups are one type of small group teaching that occurs at the academy. Individual teachers also engage in small group instruction with their own groups of students. Small group time differs from class to class and grade to grade. For example, fifth grade allows students to choose cards with different tasks on them. Students are able to self-select cards and work on projects during this team. The fifth grade teachers meet with students to monitor progress and ensure that identified objectives are being mastered. First grade, on the other hand, allow their students to self-select individualized books that are based on reading level, various smart device apps are offered, and students can choose to scan QR codes that are linked to read aloud texts. Teachers are free to determine the best course of action for their students, and students are free to work on high interest projects while still working towards mastery of core standards.

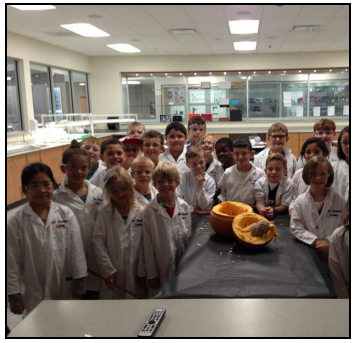


Figure 1. Third Grade Pumpkin Project

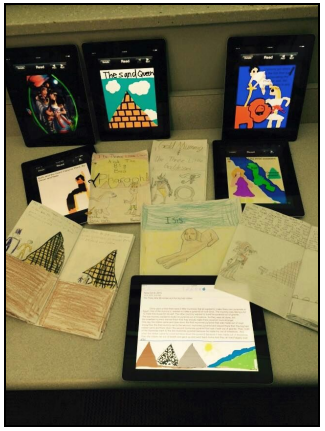


Figure 2. Sixth Grade Temples in Progress

Figure 3. Third Grade Differentiation

Figure 4. Fifth Grade Small Groups

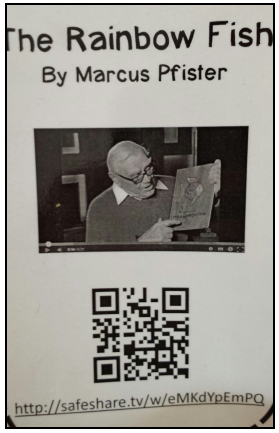


Figure 5. First Grade QR Small Group

5. **Teaching**

Teaching is conducted with a focus on STEM concepts, processes and thinking. Teachers coordinate lessons, ideas and planning among one another with a mechanism in place for doing so in both formal and informal ways. Incentives exist for supporting one another. Correlations among various aspects of STEM are articulated and explicit. The faculty demonstrates content competency in all areas of STEM and have relevant endorsements. Efforts are made to support content sharing.

Element	Non-Existent – 0 points	Developing – 1 point	Existing – 2 points	Exemplary – 3 points *(In addition to all "Existing" indicators)*
5c. Staff Spreads Practices *The staff shares with others practices they enact in their classrooms and school.*	The school does not include and/or does not have evidence of this element in practice at this time.	Work is in progress to develop this element within the school. This element is included in the school's STEM planning document.	- STEM practices and strategies are shared across all staff members in the school. - The staff at this school shares information and strategies with other schools interested in STEM practices.	- Staff members at this school provide PD/training/ consultation to each other and to other schools interested in STEM practices. - Staff members at this school share instructional materials with each other and with other schools interested in STEM practices.

Staff members at Neil Armstrong Academy are frequently asked to teach courses to school district employees. One teacher per grade level in grades three through six participate in teaching a Math and Literature class for district employees during each school year. This class is designed to help teachers integrate the richness of fine children's literature in the mathematics classroom. When the course is complete, teachers will be able to help students gain confidence in their mathematical abilities, learn problem solving, and develop a variety of math concepts while enjoying literature that supports the Utah Core State Standards for Mathematics.

Several teachers in the building also participated in creating Math Investigation Centers (MIC) for other teachers to use district wide through Safari Montage (Figure 1). The goal of the centers is to make it easier for teacher to provide challenging activities without having to plan a separate lesson every day. The tasks in these centers focus on mathematical practices rather than computation skills to provide depth and

complexity rather than breadth. The tasks are designed to allow students to pursue independent study and individualized learning. These centers are investigative and integrated, open-ended with many possible approaches and solutions, are designed to encourage speculation and creativity, and are conducive to mathematical thinking and discussion and are varied in depth of knowledge.

In addition to providing professional development for other teachers, Armstrong teachers frequently open their classrooms to other teachers to observe STEM teaching practices during the school day. Visiting teachers see a variety of math and science lessons that integrate engineering and technology. After the observation, teachers are taught the rationale behind the lesson and are given advice on how to implement it into their own classrooms, which includes where to find additional resources if necessary.

Teachers in the building also host the the School Improvement Network each school year (Figure 2). The School Improvement Network creates professional learning resources to help teachers and administrators become even more effective, because more effective educators help create more successful students. The network comes to the school and films approximately six teachers each school year teaching effective STEM lessons and places them on their website for other teachers around the world to view and implement in their classrooms.

Neil Armstrong Academy also partners with the Utah Coalition for Educational Technology and hosts Ed Camp Utah each year (Figure 3). Ed Camp Utah is a free camp available to educators. Ed Camp is about learning how to integrate technology into schools and classroom. The sessions are spontaneous, interactive, and responsive to participants' needs. The schedule of events are chosen by the participants during the morning of the camp and those who feel they are experts in various topics are ones who present the topics to the participants. Many Armstrong teachers have had the opportunity to present on various topics as well as participate in group discussion on how they use different types of technology in their classrooms.

While Armstrong teachers frequently provide professional development and share resources with teachers outside of the school, they also help each other integrate STEM based principals in each other's classrooms. The school technology specialist offers Tech Time classes to teachers every Wednesday morning and afternoon for teachers who need assistance with learning how to use different programs in their classrooms. She also visits classrooms once a month and co-teaches a lesson for teachers to integrate into their classrooms. This has been a valuable way for teachers to learn about new apps that are engaging and student focused (Figure 4).

Teachers also collaborate lessons with each other during their professional learning community (PLC) time. Teachers plan STEM Lessons with each other, discuss what went well and what didn't, and even plan extension and interventions with each other (Figure 5). Occasionally

during PLC time, teacher are able to go to other classrooms and observe how teachers in the building are using STEM focused lessons in their classrooms.

During the current school year, Neil Armstrong Academy has partnered with the University of Utah College of Education to host student teachers. Student teachers are paired with an expert teacher to learn basic teaching principles, as well on how to integrate STEM focused lessons in their own classrooms. They also learn to work with students across various age and ability levels, and from diverse cultural, linguistic and socioeconomic backgrounds. Student teachers also participate in Comprehensive Mathematics Instruction (CMI) training and are learning how to create math lessons that are project based, student-centered, and requires students to explore questions through pictures, manipulatives, and other mathematical tools (Figure 6).

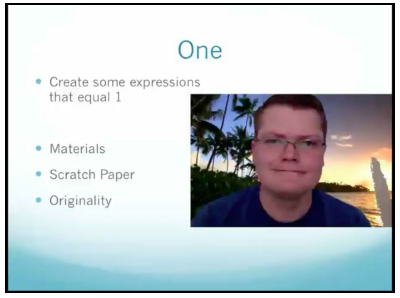
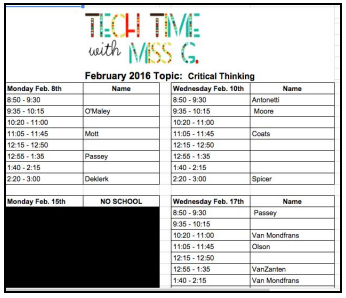


Figure 1. Screen shot of teacher explaining MIC task.

Figure 2. School Improvement Network filming a STEM lesson.

Figure 3. Armstrong hosting EdCamp Utah.



TECH TIME with MISS G.

February 2016 Topic: Critical Thinking

Monday Feb. 8th	Name
8:50 - 9:30	
9:35 - 10:15	O'Maley
10:20 - 11:00	
11:05 - 11:45	Mott
12:15 - 12:50	
12:55 - 1:35	Passey
1:40 - 2:15	
2:20 - 3:00	Deklerk

Monday Feb. 15th	NO SCHOOL

Wednesday Feb. 10th	Name
8:50 - 9:30	Antonetti
9:35 - 10:15	Moore
10:20 - 11:00	
11:05 - 11:45	Coats
12:15 - 12:50	
12:55 - 1:35	
1:40 - 2:15	
2:20 - 3:00	Spicer

Wednesday Feb. 17th	Name
8:50 - 9:30	Passey
9:35 - 10:15	
10:20 - 11:00	Van Mondfrans
11:05 - 11:45	Olson
12:15 - 12:50	
12:55 - 1:35	VanZanten
1:40 - 2:15	Van Mondfrans

Figure 4. Tech Time Schedule.

Figure 5. Teacher PLC Meeting.

Figure 6. CMI Training.

5. **Teaching**

Teaching is conducted with a focus on STEM concepts, processes and thinking. Teachers coordinate lessons, ideas and planning among one another with a mechanism in place for doing so in both formal and informal ways. Incentives exist for supporting one another. Correlations among various aspects of STEM are articulated and explicit. The faculty demonstrates content competency in all areas of STEM and have relevant endorsements. Efforts are made to support content sharing.

Element	Non-Existent – 0 points	Developing – 1 point	Existing – 2 points	Exemplary – 3 points *(In addition to all "Existing" indicators)*
5d. Common Planning Time and Individual Planning Time are Incorporated into the Schedule *Planning time specifically devoted to supporting collaborations among school staff, and planning time provided specifically for staff to prepare individually for instruction, in any way that they choose.*	The school does not include and/or does not have evidence of this element in practice at this time.	Work is in progress to develop this element within the school. This element is included in the school's STEM planning document.	- Teachers have a set time to collaborate and work individually at least monthly together to plan integrated lessons, share/co-create STEM activities, and plan learning outcomes. Regular, collaborative planning time allows teachers within grade levels to give each other advice and ideas about instruction, and work through problems together.	- Teachers have a set time to collaborate and work individually at least weekly together to plan integrated lessons, share/co-create STEM activities, and plan learning outcomes. - Regular, collaborative planning time allows teachers within and across grade levels to give each other advice and ideas about instruction, and work through problems together.

Teachers at Neil Armstrong Academy collaborate within grade level teams three times a week for forty-five minutes during their block rotation time and discuss the PLC questions (What do we want our students to learn? How will we know when they've learned it? How will we respond if they don't learn it? How can we extend and enrich the learning for students who already know it?). These questions are answered on a daily basis for all students against the appropriate essential learning targets in math, science, and language arts. Teachers work together to analyze their common formative assessment data and create flex time groups (Figure 1). As a part of flex time, students are regrouped across the entire

grade level for a portion of the day in which all students are provided immediate intervention or enrichment on essential learning standards based on their performance on a team-generated common formative assessment (Figure 2). This means all students who fail to demonstrate mastery on a concept are provided the help and support they need immediately. Additionally, all students who do demonstrate mastery on a concept are provided with enrichment and extension on that same concept. Both groups could be considered an at-risk population because both groups are in jeopardy of falling out of sync of the scope and sequence of their classmates.

Also during this time, teachers can be seen creating and sharing STEM lessons (Figure 3). They use this time to plan engaging lesson plans using their own personal sources, or researching lessons from district and internet sources. Aligning their grade level curriculum so students in all classes on that grade level are learning the same concepts is what teachers can be seen doing during their collaboration time. They utilize district pacing guides and sources to help align their lessons to what students on their grade level are learning, that way if a new student moves into the school, they will be close to the same place in the curriculum as they were at their previous school.

Having the ability to collaborate for forty-five minutes, for three times a week has allowed teachers the opportunity to see their peers teach STEM lessons. Teachers are able to go into another teacher's classroom on a different grade level and see how they utilize technology, engineering, and math in their classrooms, as well as learn how they can apply what they learned in their own classrooms.

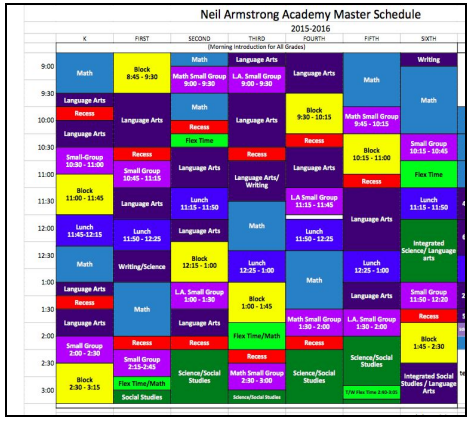


Figure 1. Flex Time Schedule

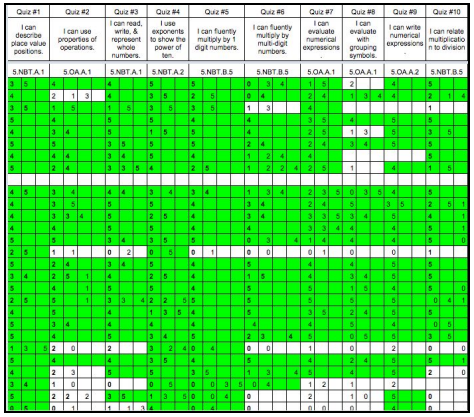


Figure 2. Example of common formative assessment data.

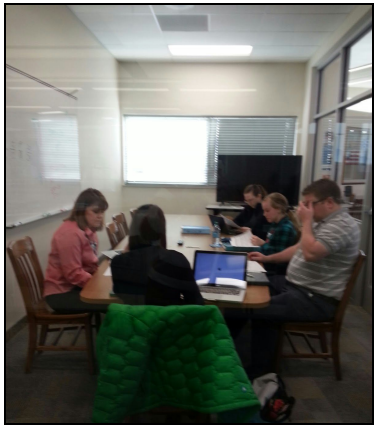


Figure 3. Example of teachers creating STEM Lessons during PLC.

6. **Student Engagement and Equity**

There is solid evidence for engagement of all demographics in the local community. Efforts are connected and follow a coherent, research-based plan. Efforts show a deep understanding of STEM equity issues and needs. Students are regularly involved in planning and conducting learning activities. Students are regularly engaged in the actual doing of science, mathematics, and project-based learning.

Element	Non-Existent – 0 points	Developing – 1 point	Existing – 2 points	Exemplary – 3 points *(In addition to all "Existing" indicators)*
6a. Support for Social and Emotional Needs of Students *The staff considers the range of students' needs. These include social, emotional, and academic needs.*	The school does not include and/or does not have evidence of this element in practice at this time.	Work is in progress to develop this element within the school. This element is included in the school's STEM planning document.	- The school has a student induction process, program, or activities that support incoming students. - Teachers reach out to family and talk with students to understand students' social and emotional well-being. - Regularly scheduled strategies and procedures have been implemented across the entire school that focus on relationships and on developing and fostering global literacy (e.g., student advisory class, class meeting, or homeroom).	- The school has a student induction process, program, or activities that supports new students' transitioning to the school in ALL grade levels. - Teachers meet regularly to discuss students' social and emotional needs. - A scheduled part of the school day extends instruction or focuses on supporting relationship building. - Annual resources are allocated to develop, revise, and sustain strategies and procedures across the entire school (e.g., student advisory class, class meeting, or homeroom). - Students, teachers, parents, and external partners provide input into strategies and procedures (e.g., student advisory class, class meeting, or homeroom).

The student induction process at Neil Armstrong Academy is both simple and effective. New students are given a "buddy" that walks the student around the school and introduces the student to various teachers and areas within the school. This allows the new student to become acquainted with the building and the people therein. Students also work with classmates during this time, which helps remove some of the fear that comes with being a new student. For all incoming kindergarten students and faculty, the school does a "clap-in." The students and teachers walk down the hallway while the entire staff and student body claps as the line walks by. It is an invigorating and unique experience (Figure 1).

Students' emotional, social, and intellectual needs are discussed formally twice per month by the school's intervention team, which includes the administration, special education team, social worker, and instructional coach (Figures 2 and 3). Teachers are encouraged to present names to be discussed and take part in these specific meetings. For example, if a teacher has a concern about a student that he or she would like to be discussed by the intervention team, the teacher fills out a form and meets with the team by appointment. The student is discussed and a plan is put in place. The student is then placed on a "radar" and is monitored regularly. In addition to the teacher requested names, the intervention team also discusses students that need additional support.

In addition to the Intervention Team meetings, teachers at the academy use Prevention Dimensions - "a set of Utah's Safe and Drug-Free Schools and Communities resource lessons which support the Utah State Office of Education (USOE) pre-kindergarten through twelfth grade health core. Teachers develop skills to teach "proven prevention strategies, impart knowledge, and help maintain positive prevention attitude." The school's Prevention Dimension leader works with teachers and tracks data monthly.

Figure 1. Students clapping in the Kindergarten.

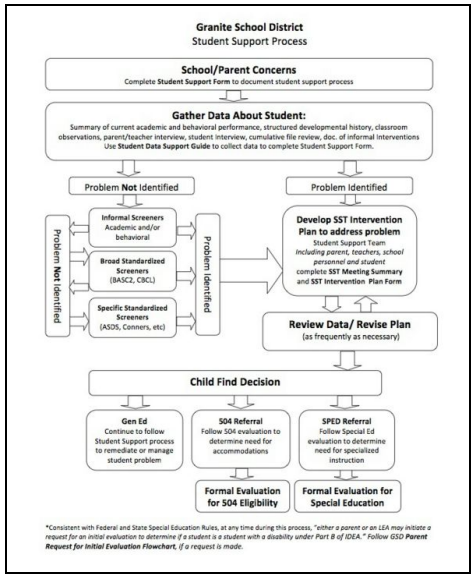


Figure 2. Student Support Process.

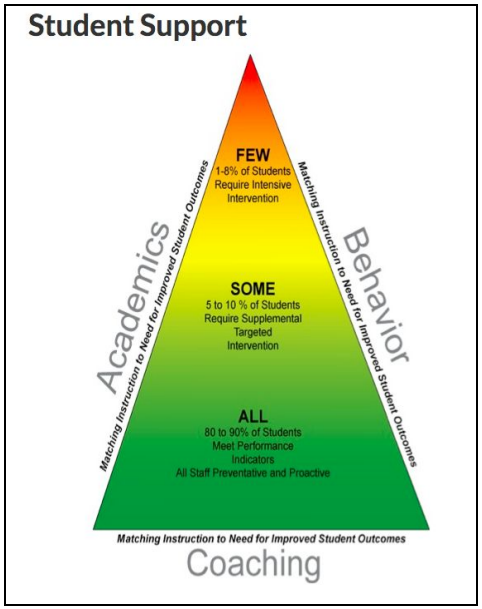


Figure. 3 Student Support Process.

6. **Student Engagement and Equity**

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Element	Non-Existent – 0 points	Developing – 1 point	Existing – 2 points	Exemplary – 3 points *(In addition to all "Existing" indicators)*
6b. Belief That All Students Can Learn *The staff takes steps to ensure all students have opportunities to master content.*	*N/A* *Belief that all students can learn is central to instruction. Schools need to have this element in place to be eligible for STEM School Certification.*	Work is in progress to develop this element within the school. This element is included in the school's STEM planning document.	- The school works to provide equitable access to rigorous, high-level courses. - All students' specific and identified needs are being met. - Specific considerations are made in STEM classrooms that support all students, including populations underrepresented in STEM fields. - Teachers receive professional development on underrepresented populations in STEM	- The school works to provide equitable access to rigorous, high-level courses. - Special programs have been designed to encourage underrepresented students to develop interest in STEM careers.

			fields to inform instruction.	

Neil Armstrong Academy has adopted the statement, “I am committed to the belief that everyone can learn,” as one of our six Collective Commitments. This philosophy drives how we structure the learning processes in the school. Collaborative teacher teams work beyond assuring the curriculum is taught and continue working towards ensuring all students have learned. Each team uses the aforementioned document we created known as the By-the-Student-by-the-Standard tracker to monitor every student’s progress towards the essential learning targets (Figure 1). Furthermore, the students themselves track how much of the curriculum they have mastered using the same document.

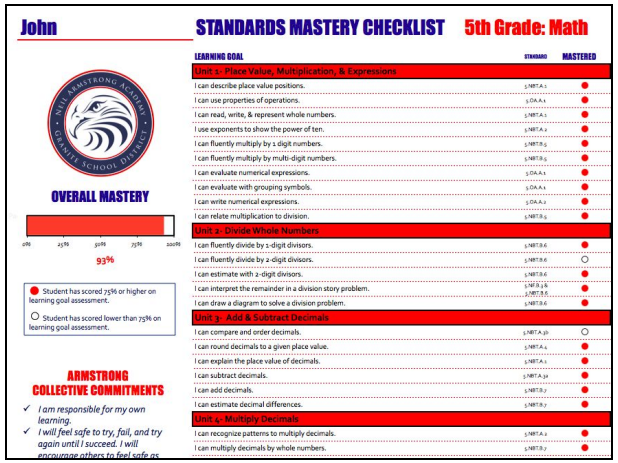
On a weekly basis, students are regrouped across the entire grade level for a flex time portion of the day in which all students are provided immediate intervention or enrichment on essential learning standards based on their performance on a team-generated common formative assessment (Figure 2). This means all students who fail to demonstrate mastery on a concept are provided the help and support they need immediately. Additionally, all students who do demonstrate mastery on a concept are provided with enrichment and extension on that same concept. Both groups could be considered an at-risk population because both groups are in jeopardy of falling out of sync of the scope and sequence of their classmates.

To facilitate the creation of appropriate common formative assessments, the planning of the daily flex time, and the analysis of the by-the-student-by-the-standard trackers, each teacher team collaborates for three 45-minute periods during the contract week (Figure 3). This means the critical PLC questions (What do we want our students to learn? How will we know when they’ve learned it? How will we respond if they don’t learn it? How can we extend and enrich the learning for students who already know it?) are answered on a near-daily basis for all students against the appropriate essential learning targets being focused on in collaboration.

Armstrong has a designated English as a Second Language (ESL) and Gifted and Talented (GT) endorsed teacher on every grade level team to help facilitate appropriate instruction for all students in these populations. A great deal of the decisions drawn upon during collaboration come from the expertise of these teachers and their backgrounds of how to support both ESL and GT students.

Armstrong has several extracurricular clubs that reach out to all populations to pursue activities they might not otherwise do. These include Lego League (Figure 4), Code Club (FIgure 5), Ozobot Club, Rocketeers (Figure 6), Girls on the Run (Figure 7), and Jump Rope Club (Figure 8). Most of these programs are not capped and can include as many students as want to participate. All are free to our students and offered at a time that

does not conflict with anything else offered by the school. The Code Club, for example, has more than 200 participants who come an hour early on Friday mornings. This makes up approximately one fourth of our entire student body.


John

STANDARDS MASTERY CHECKLIST 5th Grade: Math

OVERALL MASTERY

93%

Student has scored 75% or higher on learning goal assessment.

Student has scored lower than 75% on learning goal assessment.

ARMSTRONG COLLECTIVE COMMITMENTS

- ✓ I am responsible for my own learning.
- ✓ I will feel safe to try, fail, and try again until I succeed. I will

LEARNING GOAL	STANDARD	MASTERED
Unit 1- Place Value, Multiplication, & Expressions		
I can describe place value positions.	5.NBT.A.1	●
I can use properties of operations.	5.OA.A.1	●
I can read, write, & represent whole numbers.	5.NBT.A.3	●
I use exponents to show the power of ten.	5.NBT.A.2	●
I can fluently multiply by 1 digit numbers.	5.NBT.B.5	●
I can fluently multiply by multi-digit numbers.	5.NBT.B.5	●
I can evaluate numerical expressions.	5.OA.A.1	●
I can evaluate with grouping symbols.	5.OA.A.1	●
I can write numerical expressions.	5.OA.A.2	●
I can relate multiplication to division.	5.NBT.B.5	●
Unit 2- Divide Whole Numbers		
I can fluently divide by 1-digit divisors.	5.NBT.B.6	●
I can fluently divide by 2-digit divisors.	5.NBT.B.6	○
I can estimate with 2-digit divisors.	5.NBT.B.6	●
I can interpret the remainder in a division story problem.	5.NBT.B.6, 5.NBT.B.6	●
I can draw a diagram to solve a division problem.	5.NBT.B.6	●
Unit 3- Add & Subtract Decimals		
I can compare and order decimals.	5.NBT.A.3b	○
I can round decimals to a given place value.	5.NBT.A.4	●
I can explain the place value of decimals.	5.NBT.A.1	●
I can subtract decimals.	5.NBT.A.3a	●
I can add decimals.	5.NBT.B.7	●
I can estimate decimal differences.	5.NBT.B.7	●
Unit 4- Multiply Decimals		
I can recognize patterns to multiply decimals.	5.NBT.A.2	●
I can multiply decimals by whole numbers.	5.NBT.B.7	●

Figure 1. Standards Mastery

Figure 2. Flex Time

Figure 3. Collaboration

Figure 4. LEGO League

Figure 5. Code Club

Figure 6. Rocketeers

Figure 7. Girls on the Run

Figure 8. Jump Rope Club

6. Student Engagement and Equity

There is solid evidence for engagement of all demographics in the local community. Efforts are connected and follow a coherent, research-based plan. Efforts show a deep understanding of STEM equity issues and needs. Students are regularly involved in planning and conducting learning activities. Students are regularly engaged in the actual doing of science, mathematics, and project-based learning.

Element	Non-Existent – 0 points	Developing – 1 point	Existing – 2 points	Exemplary – 3 points *(In addition to all "Existing" indicators)*
6c. Student Participation in Decision-Making	The school does not include and/or does not have evidence of this element in practice at this time.	Work is in progress to develop this element within the school. This element is included in the school's STEM planning document.	- Students participate in the development/revision of the code of behavior and values. - Students are encouraged to give feedback at any time (via a suggestion box, etc.). -There are structured opportunities for students to provide feedback.	- Students participate in high-level school decision-making, such as disciplinary regulations, course planning and development. - School has a system in place to ensure that there is representative voice in student decision-making.

Armstrong Academy engages students in a variety of student-centered and student-driven learning methods. For example, teachers develop lessons using the Granite School District's Lesson Design Template (Figure 1), which requires planning for different types of learners, including extensions for those who master the core content, as well as interventions for those students who need additional support. Many lesson at Armstrong are planned to use the inquiry model of learning. In addition, many teachers have incorporated Google's idea of Genius Hour into their classroom. The idea behind Genius Hour is that students spend a set amount of time each week researching and working on ideas that they

are passionate about. Students are challenged to explore projects of their own choosing, and spend time researching and then creating a product to share their knowledge with the class, school, and/or world.

Armstrong Academy students are offered many opportunities for enrichment and development of their own unique talents through extra-curricular activities and clubs. Each week, student anchors, weathermen, and editors produce a weekly news episode for the school's ABC News broadcasting network. In addition, Armstrong students participate in the Hour of Code each year, and have an extra-curricular code club that includes nearly one fourth of the student population (Figure 2). Students interested in team centered robotic design participate in Lego League (Figure 3), those interested in music join the Rocketeers choir (Figure 4), mathematically minded problem solvers participate in Math Olympiads, and kinesthetic driven students participate in a jump rope club (Figure 5) or Girls on the Run. In addition, Armstrong maintains a safety patrol focused on student safety and school service, and also has a student elected Student Council. The Student Council assists in service projects and develops student leadership skills. Student Council members have recently made and published school expectation videos to help demonstrate Armstrong's school-wide expectations for behavior in various areas of the school.

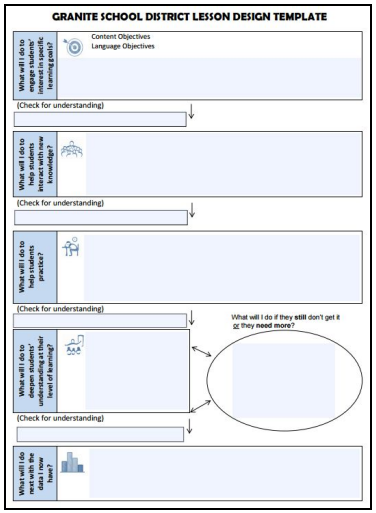


Figure 1. Design Template

Figure 2. Code Club

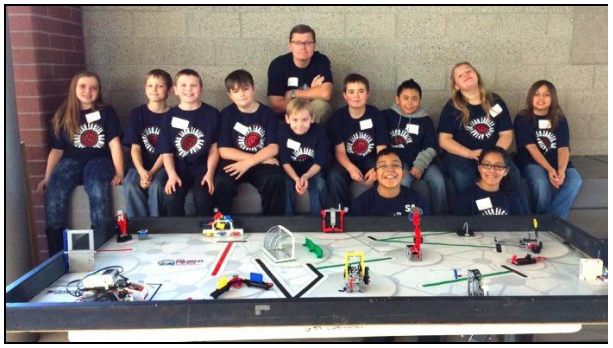


Figure 3. LEGO League

Figure 4. Rocketeers

Figure 5. Girls on the Run

6. **Student Engagement and Equity**

There is solid evidence for engagement of all demographics in the local community. Efforts are connected and follow a coherent, research-based plan. Efforts show a deep understanding of STEM equity issues and needs. Students are regularly involved in planning and conducting learning activities. Students are regularly engaged in the actual doing of science, mathematics, and project-based learning.

Element	Non-Existent – 0 points	Developing – 1 point	Existing – 2 points	Exemplary – 3 points *(In addition to all "Existing" indicators)*
6d. Extracurricular Activities *Students have the opportunity to participate in sports, clubs, and STEM activities that take place outside of regular school hours.*	The school does not include and/or does not have evidence of this element in practice at this time.	Work is in progress to develop this element within the school. This element is included in the school's STEM planning document.	- Programming is connected to the school day curriculum. - The school offers extracurricular activities that are engaged in by **some** of the students. - Some of the students participate in STEM competitions on-site/online STEM exhibits, and/or in state and national STEM forums.	- STEM experiences are directly connected in in-class learning. - The school offers extracurricular activities that are engaged in by **most** of the students. - **S**tudents participate in STEM competitions on-site/online STEM exhibits, and/or in state and national STEM forums.

The LEGO League (runtime from 6:13 - 9:48) is one such extracurricular activity that students are able to participate in. The Academy's LEGO League utilizes the *FIRST* LEGO League curriculum, challenges, and scoring guide as the standard for which the program is run (Figure 1). The curriculum and goals present students with a real-world problem. Students are expected to research the problem and are challenged to develop a solution. For example, this year's challenge is the TRASH TREK. "The TRASH TREK Challenge asks teams to explore the hidden but fascinating world of trash, from collecting, to sorting, to smart production, and reuse. They must also invent a solution to help our trash problem and create their own LEGO MINDSTORMS robot to accomplish trash-themed "missions" on a playing field, and show how well they practice *FIRST* LEGO league Core

Values." To accomplish these goals, students participate in mixed teams. Teams are comprised of fifth and sixth grade students, which include a wide mix of ethnicities, genders, and abilities. League members work together to develop presentations, robot programming, and solutions to the challenges presented. Students are able to participate in scrimmages with local elementary schools. This gives league members an opportunity to mingle with students from various communities to bounce ideas off one another, learn from each other, and grow as teams and individuals as they take part in robot games. All of the students' hard work culminates at a grand competition. Teams gather at a local high school to compete, engage in the games, and showcase their ideas. The top three teams are then invited to participate at the state level.

Code Club (Figure 2) is another STEM based extracurricular activity that all students are able to participate in at the Academy. Students are placed into groups based on age and ability. They then run through a series of courses that teach a wide range of programming skills. Simple lessons may require students to focus on direction and movement using pre-programmed blocks. Lessons increase in difficulty as students master simpler skills. At the higher difficulty levels, students are asked to work with actions, loops, functions, logic sequences, and mathematics programming. Students are also able to participate in "open" worlds that allow the child to create interactive stories, working games, and write code to their heart's content. The courses are accessible, individualized, and engaging.

The fourth grade is working with the school technology specialist on specialized programming with Ozobots. Ozobots are robots that can be programmed to run specific tasks. Students learn to program the bots using color coded blocks that can be programmed on paper using strips of color, or programmed directly into the bot using computer software. This builds on the skills taught in Code Club and prepares students for Lego League. Students work away from simple programming and into more complicated programming using logic, loops, and sequencing. Regardless of the difficulty level, students in the club are required to think logically, mathematically, and creatively.

Finally, Armstrong has moved away from the traditional science fair and have moved towards a STEM fair (Figures 3 - 5). The new format will allow students to now create projects that explore technology, engineering, mathematics, science, and a mix of the of the fields. The district is making an effort to get students to work on projects in these new areas, specifically computer science, mathematical applications, and engineering. Neil Armstrong Academy has fully embraced these changes and have been working on the process of research experiments for all STEM areas. This integration has allowed the students to become familiar with questioning, research, investigating, data collection and presentation, conclusions, and reflections. This handling of the process ensures that the students become familiar with the details and are able to move away from guided instruction and towards independent performance. The STEM fair is a friendly competition that allows the students to showcase their hard work and highlight the fantastic progress in gaining a better understanding of STEM.

Figure 1. LEGO League.

Figure 2. Code Club.

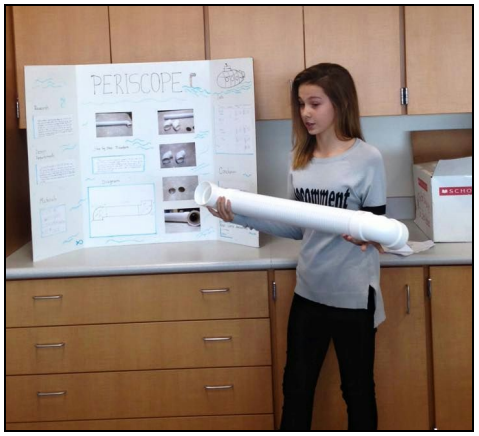


Figure 3. STEM Fair.

Figure 4. STEM Fair.

Figure 5. STEM Fair.

6. **Student Engagement and Equity**

There is solid evidence for engagement of all demographics in the local community. Efforts are connected and follow a coherent, research-based plan. Efforts show a deep understanding of STEM equity issues and needs. Students are regularly involved in planning and conducting learning activities. Students are regularly engaged in the actual doing of science, mathematics, and project-based learning.

Element	Non-Existent – 0 points	Developing – 1 point	Existing – 2 points	Exemplary – 3 points *(In addition to all "Existing" indicators)*
6e. Representative Population *School maintains student population with a focus on reflecting a population representative of the community/area the school serves.*	The school does not include and/or does not have evidence of this element in practice at this time.	Work is in progress to develop this element within the school. This element is included in the school's STEM planning document.	- The school engages in outreach, support, and focus on underrepresented student populations.	- The school actively recruits student populations reflective of the diversity and gender of the local community. - School population is fully representative of the diversity and gender of the local community.

Neil Armstrong Academy is a public school. The school follows state and district policy when enrolling students under open enrollment. Guidelines for students to attend a school other than their home school in Granite School District have been established and comply with the standards of the "Enrollment Options Program" as outlined in Utah Code 53A-2-206.5 through 213. All other applications are handled on a first-come, first-serve basis. Applicants receive written notification of acceptance or denial of their open enrollment application. Each application is screened and considered on an individual basis based on available space by building, grade, class, or program. Academic standing, gender, socioeconomic status, and ethnicity are not factors for acceptance.

Armstrong Academy has 804 students enrolled at the school. The population of the school consists of two-thirds of the students who live within the school boundary and one-third that attend on open enrollment and live in various areas along the Wasatch Front. The demographic of Neil Armstrong Academy reflects that of its community. For the current school year Armstrong consists of 59.58% of students identified as Caucasian/White, 17.16% Hispanic/Spanish, 8.71% are Pacific Islander, 5.72% African American, 7.21% Asian, and 1.62% American Indian/Alaskan Native. 44% of the students qualify for free and reduced price lunch. 13.60% of students enrolled are considered English Language Learners. There are 8.50% of Armstrong students enrolled in Special Education. There are currently more male students than female students at Armstrong. Of the 804 students, 57.93% are male, and 42.07% are female.

6. **Student Engagement and Equity**

There is solid evidence for engagement of all demographics in the local community. Efforts are connected and follow a coherent, research-based plan. Efforts show a deep understanding of STEM equity issues and needs. Students are regularly involved in planning and conducting learning activities. Students are regularly engaged in the actual doing of science, mathematics, and project-based learning.

Element	Non-Existent – 0 points	Developing – 1 point	Existing – 2 points	Exemplary – 3 points *(In addition to all "Existing" indicators)*
6f. Student Autonomy *Students have independence in and ownership of their learning. Students set goals for their learning and make choices about how to accomplish them.*	The school does not include and/or does not have evidence of this element in practice at this time.	Work is in progress to develop this element within the school. This element is included in the school's STEM planning document.	- Some lessons/activities required students to take initiative and be self-directed. - The majority of STEM lessons/activities require students to manage their own work and bring it to completion. - Students make meaningful choices about their learning (e.g. choosing a topic) experiences.	- Most lessons/activities required students to take initiative and be self-directed. - Most STEM lessons/activities require students to manage their own work and produce results. - Teachers seek input from students about their personal interests to incorporate into lessons. - Students make choices that significantly shape their learning experiences (e.g., choose style of learning). - Teachers allow students to lead the class. - Teachers seek input from students about their personal interests to incorporate into lessons.

The staff at Neil Armstrong Academy understand the value of student-directed learning and including student interests in everyday education. The focus at the academy is the student and engaging the student in a variety of ways. Although this may look different from grade to grade, all grades have included various types of project-based learning.

Student choice projects are big at Neil Armstrong Academy. Students in several grades are allowed to choose a subject to research and a media for their presentations. Many of the students at the school choose to present their projects through an electronic format. Students are familiar with several types of traditional computer software and newer applications found on smart devices. Some of these applications include, but are not limited to, Tellagami, Storykit, Show Me, Movie maker, Halftone, Popplet, Pic Stitch, and My Story (Figure 1). Students are encouraged to try new programs and ways to research and present their student-choice projects.

Initiative is required on a daily basis at Neil Armstrong. Teachers require that students engage in a variety of ways throughout the school day. This is done in numerous ways. Teachers use the CMI method of teaching mathematics. This requires students to explore questions through pictures, manipulatives, and other mathematical tools (Figure 2). Students also engage in conversation as they analyze each other's methods and discuss problem solving and solutions. Some of our grades use self-directed cards for science and engineering lessons. Students are given cards with tasks and a set of materials. Students are then expected to research the problem, create solutions, and do much of the work alone or in small groups. Many small groups are student-directed as well. Students are able to choose from a wide range of options that are tied to core concepts (Figure 3). They are not told which to do or how to accomplish their goals. Progress is monitored weekly and students are able to share their work with others.

The teachers at the academy are quite clever in including student interests into lessons. For example, the fifth grade uses Minecraft to teach their students various social studies and language concepts (Figure 4). Students are spawned into a random environment in the game and are tasked with exploring, building communities, and a host of other activities. This information is then tied to what the early settlers did in America. Students build a Bill of Rights in Google Docs and share these documents with other students and their teachers. The software used in this project is of high-interest and creates excitement in teaching concepts and ideas. Another example of student interest inclusion can be found in fourth grade. Teachers have engaged in a partnership with various wildlife organizations and universities in the state that have placed camera traps in local habitats. The students are able to access the camera feeds to explore the various types of wildlife in a particular area. Students love this project and frequent the feeds while at school and at home. Students collect information, research areas, and present their findings to their peers.

Finally, students at the school have ample opportunity to take the floor and lead various portions of class discussions and learning. The CMI method for mathematics requires students to lead the conversation on their thinking and solutions. Many of the scientific and engineering projects are student directed. Students are expected to lead conversations about their tasks, and to work collaboratively to develop solutions. Whether it's a first grade project on designing bridges to a sixth grade series on civilizations (Figure 5), students are the directors and proponents of information.

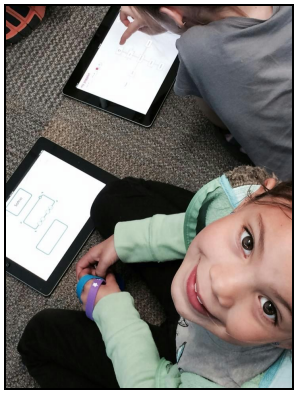


Figure 1. Student Choice on the iPad

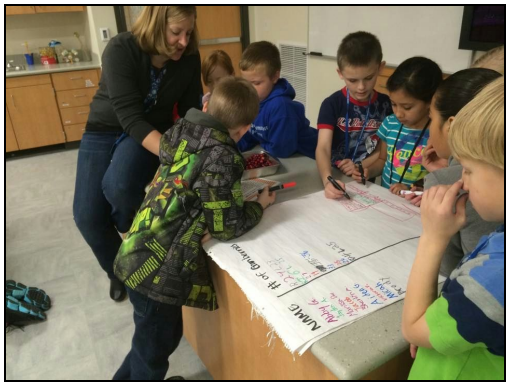


Figure 2. Student CMI

Figure 3. Small Group

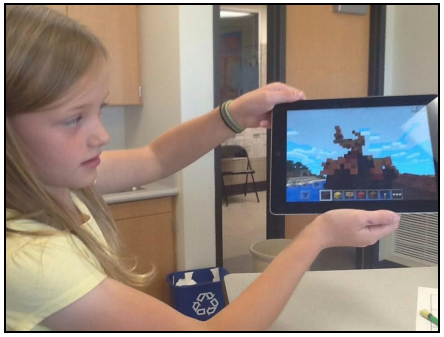


Figure 4. Minecraft

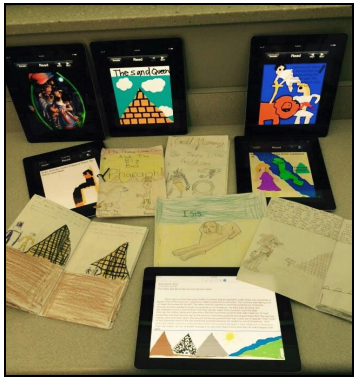


Figure 5. Civilizations

6. **Student Engagement and Equity**

There is solid evidence for engagement of all demographics in the local community. Efforts are connected and follow a coherent, research-based plan. Efforts show a deep understanding of STEM equity issues and needs. Students are regularly involved in planning and conducting learning activities. Students are regularly engaged in the actual doing of science, mathematics, and project-based learning.

Element	Non-Existent – 0 points	Developing – 1 point	Existing – 2 points	Exemplary – 3 points *(In addition to all "Existing" indicators)*
6g. Students Reflect on Their Learning *Students reflect on the strengths and weaknesses of their learning approaches and ways they can improve them; students accept changes.*	The school does not include and/or does not have evidence of this element in practice at this time.	Work is in progress to develop this element within the school. This element is included in the school's STEM planning document.	- Most classes employ the use of self-assessment for students to reflect on their learning specific to content and skills for each unit/problem solving learning project. - Students identify and document strengths and weaknesses at least twice a year in collaboration with faculty.	- All classes employ the use of self-assessment for students to reflect on their learning specific to content and skills for each unit/problem-solving learning project. - Students identify and document strengths and weaknesses more than four times per year in collaboration with faculty. - School maintains a portfolio of student reflections to inform students' continued self-assessment over the course of their high school career.

Having students reflect on their learning and identifying their strengths and weaknesses is a work in progress at Neil Armstrong Academy. While all teachers are keeping track of student data and are using it to differentiate their classroom instruction, having students reflect on their own achievement is only occurring in some classrooms. Many teachers at Armstrong have systems in place that allow students to reflect on their learning and keep track of their progress, but student personal data tracking has not yet been streamlined across each grade level or throughout

the school. Several teachers use Google Classroom to have students monitor and reflect on their progress on various assessment tools. Students in these classrooms are using Google Sheets to graph and monitor their progress and achievement. Other classes have their students monitor, gather, and reflect on their data using data books to chart their own data. Students who are keeping track of their own data are doing so with the math scores they receive on their Standards-Based quizzes. They use a tracker to keep track of all of the standards they are expected to pass off during the school year. Other classes have students keep track of their writing test scores from Utah Compose (Figure 1), and their DIBELS progress monitoring (Figure 2) and benchmark scores. Also, many teachers have students keep track of their pre and post scores on the SAGE Granite Quarterly Benchmark Math and Language Arts assessments.

There is no set way for students to place artifacts in a digital portfolio. There are two different types of digital portfolios that students at Armstrong are using. One is through Evernote. Some teachers within the building have Evernote accounts for their students. Students are able to take snapshots of their work and place it in Evernote along with any writing they choose to include. However, many teachers are moving towards having students build a digital portfolio using Google Classroom and Google Drive (Figure 3). This is made possible with the help of Granite School District providing each student in the district their own Granite School District Gmail account that will follow the student throughout their enrollment in the district. Building a digital portfolio using Google Classroom has provided students with organized ways to keep essays that they have written, projects that they have worked on, and any other artifacts that they choose to include in one place that can access from home, school, or wherever they choose. Using this source has proven to be a more sustainable method for students to build a portfolio that is reflective of their learning and progress throughout each school year.

Students reflect on their learning in a variety of ways at Armstrong. Many teachers utilize Google Classroom and Edmodo as an excellent tool to help students think about have learned. For instance, teachers in fifth grade and sixth grade classrooms post discussion topics in Google Classroom or Edmodo to help students think about their learning, and to set goals about their achievement. Other classrooms use more traditional ways for students to reflect on their learning and set academic goals, such as using a worksheet and keeping a binder or a folder for a portfolio. Traditionally, students reflect on their achievement and set goals at the beginning of the school year and in the spring during Student, Educator, Parent (SEP) Conferences.

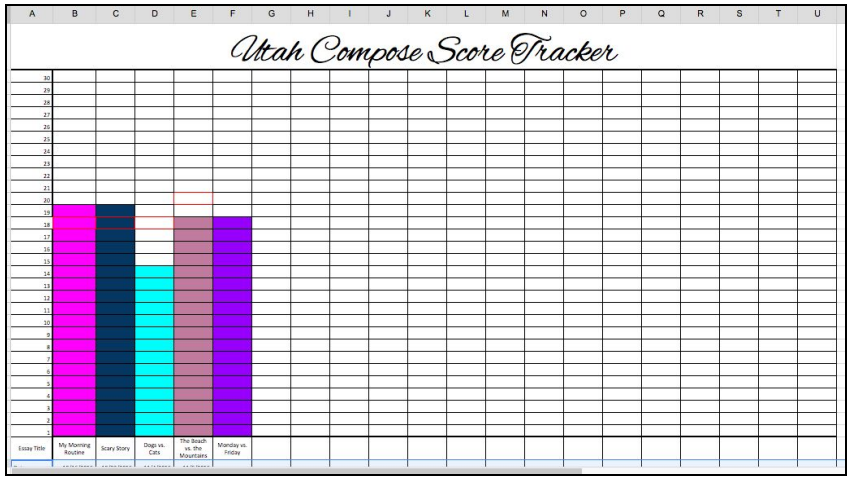


Figure 1. Example of student using Google Sheets to track their writing progress.

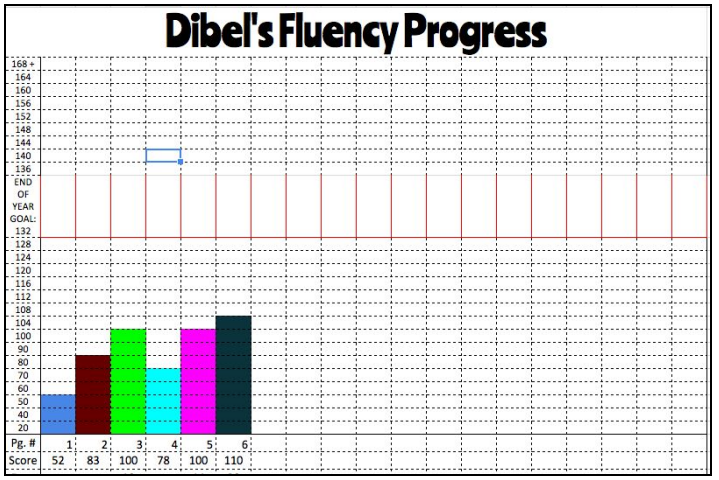


Figure 2. Example of student tracking their reading fluency progress.

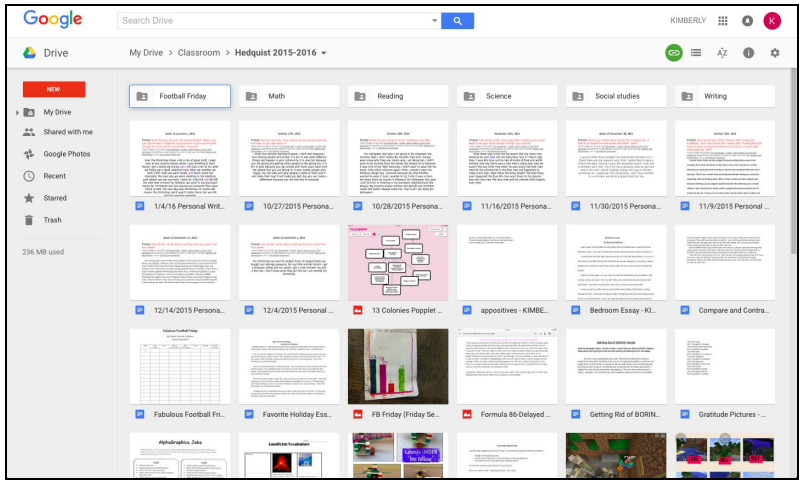


Figure 3. Example of student e-portfolio in Google Drive.

7. **Community**

There is an established community of practice regarding STEM learning and STEM teaching. Events, activities and opportunities for involvement help students, teachers, parents and community members learn about and support STEM education in the school.

Element	Non-Existent – 0 points	Developing – 1 point	Existing – 2 points	Exemplary – 3 points *(In addition to all "Existing" indicators)*
7a. Family Involvement *Families are aware of/participate in student activity and achievement.*	The school does not include and/or does not have evidence of this element in practice at this time.	Work is in progress to develop this element within the school. This element is included in the school's STEM planning document.	- Staff members keep students' parents/guardians up to date about classroom instruction and their student's learning. - Some teachers use technology to regularly communicate student progress to parents/guardians. - Opportunities exist for parents to be involved in presentations and/or assisting in the classroom.	- Staff members keep students' parents/guardians up to date about classroom instruction and their student's learning and seek structured feedback. - All teachers use technology to regularly communicate student progress to parents/guardians. - The school actively engages in strategies to increase parent engagement.

Staff and administration at Armstrong Academy keep students' parent/guardians up to date about classroom instruction and student learning in a variety of ways. The school maintains a school website and regularly posts to both a school Facebook and Twitter page to inform parents of current happenings and upcoming events. At the beginning of the 2015-2016 school year, the community was invited to participate in a Twitter hosted scavenger hunt in which Armstrong memorabilia was hidden in various locations around the Salt Lake valley on each of the eleven days leading up to the start of the school year. (The Eleven Days of Armstrong Video)

Teachers use Facebook to share grade-level specific information as well as individual Twitter accounts to share classroom information. Each week, administration uses Mail Chimp to help deliver a weekly electronic newsletter called the "Above and Beyond" to over five hundred Armstrong family and community subscribers. The majority of teachers communicate with parents through teacher newsletters as well. The Armstrong Broadcasting Corporation, or ABC News, is a student run news broadcast done weekly at the school, which spotlights the week's events and highlights the learning going on in classrooms. ABC News episodes are posted and archived on the school's YouTube channel.

Parents attend SEP conferences two times per year and Armstrong hosts numerous school activities, both by school staff and the active Parent Teacher Association throughout the school year. Armstrong has an involved School Community Council that helps to disseminate information to the community and assists the school in making decisions, including looking at student achievement data and assessing school needs in order to plan how to spend the school's Trust Lands monies. The School Community Council is an integral part of Armstrong's functionality, decision making, and communication outreach to the community. (SCC Page on Website)

Surveys taken in the fall indicate high levels of satisfaction with regards to community support and parent involvement. The community support survey indicated that the community feels that they are able to participate within the school in a variety of ways. 81% of those surveyed indicated that all four factors on the survey was seen within the school (FIgure 1). An additional 6% indicated that three of the factors are seen within the school community. Parent involvement represents the conditions in place to encourage parents to take part in their child's education. As the chart shows, parents are quite happy with the involvement encouragement the school offers (97%) (Figure 2).

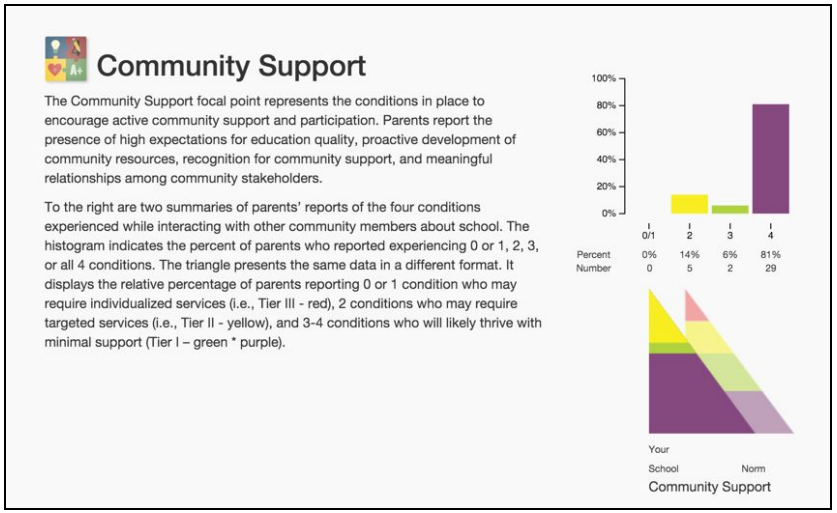


Figure 1. Results from a Conditions for Learning survey Fall 2015.

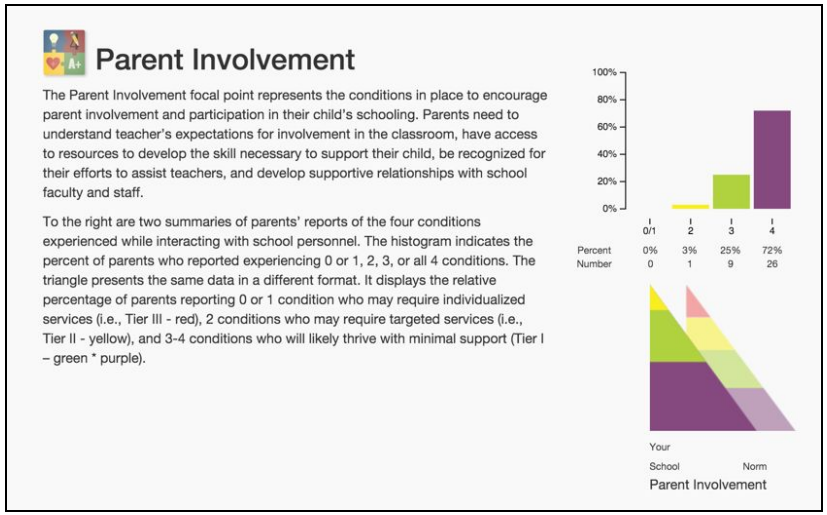


Figure 2. Results from a Conditions for Learning survey Fall 2015.

7. Community

There is an established community of practice regarding STEM learning and STEM teaching. Events, activities and opportunities for involvement help students, teachers, parents and community members learn about and support STEM education in the school.

Element	Non-Existent – 0 points	Developing – 1 point	Existing – 2 points	Exemplary – 3 points *(In addition to all "Existing" indicators)*
7b. Service Learning *Students participate in service learning or volunteer activities to give back to partners in the community.*	The school does not include and/or does not have evidence of this element in practice at this time.	Work is in progress to develop this element within the school. This element is included in the school's STEM planning document.	- Students engage in service-learning opportunities that are aligned with school curriculum and instruction at least once per year.	- Students and some partners engage in service learning opportunities that are aligned with school curriculum and instruction two or more times per year. - Student leadership is evidenced in the planning and implementation of service learning.

Students at Neil Armstrong Academy are engaged in several service learning opportunities with the help of valuable community members. The service learning that students participate in is aligned with state core curriculum in a variety of ways. Since Armstrong has been open, the school has partnered with Oakbridge Nursery, Jump Rope for Heart, the Granite Education Foundation, and Primary Children's Hospital.

A service project that Neil Armstrong Academy students participate in benefits the students and their families as well as the school. The school calls this service project "The Armstrong Greenhouse Grab." Due to generous donations from Oakbridge Nursery, a business partner of Neil Armstrong Academy, the school has seeds, soil, and planting materials for students to use in the greenhouse. Students on every grade level use the scientific method to learn about plants and how to grow and take care of them. When the plants are big enough, the school holds a greenhouse grab and sells the plants that the students parents and to community members (Figure 1). All proceeds go towards replenishing the greenhouse

with soil, seeds, and other materials to help keep the greenhouse fully supplied and ready for student use. The Greenhouse grab usually occurs two times a year, in the fall and in the spring.

Students at Armstrong also partner with Jump Rope for Heart on a yearly basis (Figure 2). The school partners with the Armstrong Academy Jumprope team with the goal of establishing healthy living. The event engages students while empowering them to improve their own health and to help other kids with heart-health issues. Students learn about community service, learn how to develop heart-healthy habits, and learn jump roping skills. Students ask friends and family for donations and all of the proceeds go to the American Heart Association for healthy-heart education and research.

Recently, students partnered with the Granite Education Foundation to gather socks for Santa Sacks. The Santa Sacks program is designed to help 2,000 under-served families lighten their load. Santa Sacks provides children in grades Pre-K through 6th with a fun filled gift-sack packed with clothing essentials: a hat, warm gloves, a book and a small toy. Santa Sacks allow the community to come together and celebrate the season of giving. Students who gathered socks created and wrote cards for the students receiving the sacks (Figures 3 & 4).

6th grade students completed a service learning project for Primary Children's Hospital. They made thirteen fleece blankets using fabric donated from Nuttalls Fabric Shop. The students used what they have learned in math to measure and cut the blankets to the appropriate dimensions, and also had to figure out how many sections they needed to cut to tie the blanket together (Figure 5) . They also made ninety I-Spy bottles to entertain and teach children (Figure 6). The I-Spy bottle contained objects that the sixth grade students learned about in their heat, light, and sound science unit. Next, they made twenty-five shadow puppet theatres for the children to play with. Students had to use their engineering skills to build their theaters and decorated them using paint and other materials that would make the theatres more fun to use. Lastly, they wrote letters of encouragement to the children at the hospital.

Figure 1. Armstrong Greenhouse Grab.

Figure 2. Jump Rope for Heart.

Figure 3. Socks for Santa Sacks.

Figure 4. Cards for Santa Sacks

Figure 5. Making blankets.

Figure 6. I-Spy Bottles.

7. Community

There is an established community of practice regarding STEM learning and STEM teaching. Events, activities and opportunities for involvement help students, teachers, parents and community members learn about and support STEM education in the school.

Element	Non-Existent – 0 points	Developing – 1 point	Existing – 2 points	Exemplary – 3 points *(In addition to all "Existing" indicators)*
7c. School Establishes and Maintains Community Presence *School actively engages the community and participates in community involvement activities.*	The school does not include and/or does not have evidence of this element in practice at this time.	Work is in progress to develop this element within the school. This element is included in the school's STEM planning document.	- The facility is open to students before and after school hours to help build the school community and provide opportunities to continue academic work. - School supports community-based events with facilities. - STEM teams communicate frequently and consistently with the community.	- The school works with community organizations to support community initiatives (e.g., staff and students volunteer, school and community organizations work together for a common cause). - Opportunities exist to showcase student work through community events via on-site or online exhibitions.

Neil Armstrong Academy works with community organizations to support community initiatives. The Armstrong Community Council is among the most vibrant in Granite School District and is comprised of 10 representatives serving two-year terms chosen from an annual competitive election (Figure 1). The group meets monthly and discusses important topics that affect the school and it's community. Members views and votes guide the use of our trust land budget, staffing plans at the school, and many other decisions made by the school.

One of the the first projects tackled by the members of the our community was our weather station, which was spearheaded by a parent, supported by the University of Utah, and donated by many local companies (Figures 2 and 3). The university had a need for a weather data point in West Valley. The local community has been able to use the same data to adjust watering times for their sprinkling systems during the summer. The school received a first class weather station to be used in a variety of ways at the school.

At the beginning of each school year, Neil Armstrong Academy hosts a school carnival (Figure 4). The purpose of the carnival is to bring the community together and allow for a pleasant time and relationship building. The school invites students and their families, as well as members from the community. The school believes this is a positive way for the families to connect with the community and all of those involved in student learning at the academy. The turnout has been quite successful in each of the three years the program has run and will continue to run for the foreseeable future.

It is not rare to see students partaking in various activities at the school at all times of the day. The school has specialty programs running at both the beginning and end of the day. For example, Code Club (Figure 5) runs before school on every Friday. LEGO League and several of the other clubs run after school. Teachers, parents, and other stakeholders work with students at these pre and post school hours to build student confidence, their academic ability, and to build positive relationships between students.

EdCamp (Figure 6) is a program run at Neil Armstrong Academy that allow community members to teach one another about integrating technology into core subject areas. All classes and programs are flexible and are taught according to the needs of the members visiting on that particular day. For example, participants learned how to use Google Classroom, various presentation and communication tools, and various hardware. For the 2015 - 2016 school year, there were over 300 community members and teachers learning and working together.

Showcasing student work is one of the most enjoyable activities the staff at Armstrong Academy take place in. This is one way the staff at the school communicates with parents and the community at large. In addition to displaying student work throughout the school, student work is also displayed throughout the community. For example, the West Valley Community Center had student work on display for a particular event. Students have made small scale models of the school that were put on display at the architectural firm involved with the school. Student work photos, thank you notes, and other material are on display throughout the community and with the school's partners.

Figure 1. Community Council

Figure 2. Donors that made the weather station possible.

Figure 3. Granite Credit Union and 100% for Kids donated $5000 grant for the Weather Station.

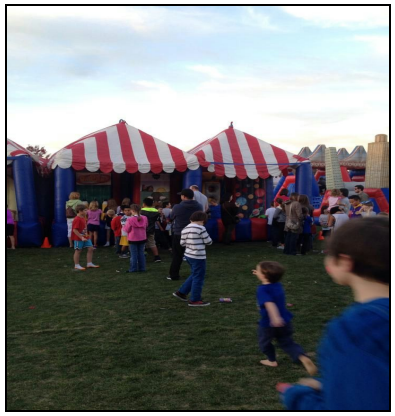


Figure 4. School Carnival.

Figure 5. Code Club.

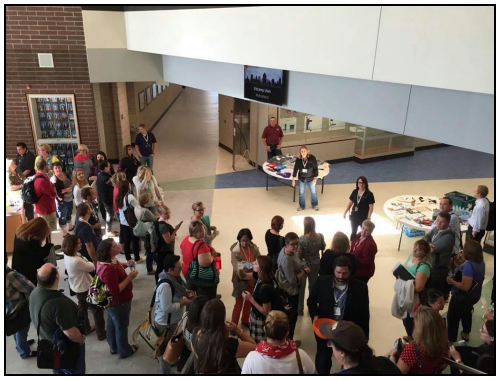


Figure 6. EdCamp Utah.

8. **Facilities**

Spaces are available for collaboration and project work. Facilities have been adapted or designed for STEM learning. Facilities reflect a focus on STEM learning efforts. Facilities reflect student design and input in the use of the facilities. Materials and equipment follow safety protocols. Obvious efforts have been made to make resources available to students for use in learning, design and project efforts.

Element	Non-Existent – 0 points	Developing – 1 point	Existing – 2 points	Exemplary – 3 points *(In addition to all "Existing" indicators)*
8a. Technology Use *Students use technology as intended for learning purposes.*	The school does not include and/or does not have evidence of this element in practice at this time.	Work is in progress to develop this element within the school. This element is included in the school's STEM planning document.	- The teacher uses current and emerging technologies in instruction of most classes. - Teachers teach students specific skills using a range of technologies (computers to AutoCad, etc.). - Products of 21st century technology tool use by students are visible throughout the school through several grade levels. - Teachers and students receive ongoing access and opportunities to expand their proficiency in	- The teacher uses current and emerging technologies in instruction of ALL classes. - Products of 21st century technology tool use by students are visible throughout the school through ALL grade levels. - Teachers and students receive ongoing access and opportunities to expand their proficiency in technology use at least once per month. - Teachers challenge students to identify and use the tools they need to solve problems. - Technology is used to engage in global learning opportunities and communities that extend beyond the state of Utah.

			technology use at least once per year.	

Neil Armstrong Academy has a one-to-one iPad to student ratio (Figure 1). Teachers attended one or two years of professional development facilitated through Granite School District's Educational Technology department titled "TILT", an acronym for the program "Teaching Increases Learning through Technology", in which teachers learned how to incorporate the use of technology in a learning environment that focuses on higher level thinking, collaboration, student-to-student interaction, creativity, and an emphasis on 21st century skills.

In addition to iPads, the school has two mobile laptop computer labs (Figure 2), SMART boards in each classroom (Figure 3), Apple TVs in each classroom and common meeting area (Figure 4), telescope and microscope sets (Figure 5), a green-screen room to assist with the student run weekly news via the Armstrong Broadcasting Network (Figure 6), a 3D printer, LEGO robots (Figure 7), Ozobot robots, an interactive weather station (FIgure 8), interactive touch screen TVs in STEM labs and the school library (Figure 9), and a commons area display that includes three 80 inch televisions (Figure 10).

Products of 21st century technology tools are visible through Armstrong Academy's display cases, in and around teachers' rooms, posted on the school website, and collected in student digital portfolios. Students use iPads daily to access digital information, practice standards based skills, and create work to demonstrate proficiency. Students are explicitly taught research skills and the use of numerous apps. Students are expected to use their iPads in a variety of ways to access information and demonstrate understanding. In addition, Armstrong Academy students use Spatial Temporal (ST) Math, iXL Math, and MClass on site-based licenses to improve math and reading skills.

Armstrong Academy is a partner with an air quality study conducted through the University of Utah, and equipment is stored on school grounds that is collecting air particulates to better inform scientists in the study of air quality in West Valley City. Students will be included in this study, as the university scientists gather information. Many teachers use collaboration and communication tools including Skype, Google Classroom, and Edmodo to work with and learn from students and teachers in and around the state of Utah, as well as nationwide.

Figure 1. 1 to 1 iPads

Figure 2. Laptop Cart

Figure 3. SMART Board

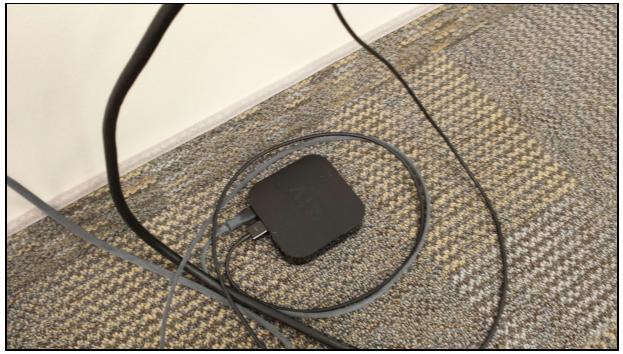


Figure 4. Apple TV

Figure 5. Microscopes

Figure 6. Greenscreen

Figure 7. LEGO Robot

Figure 8. Weather Station

Figure 9. Touchscreen

Figure 10. Displays in the Commons

8. **Facilities**

Spaces are available for collaboration and project work. Facilities have been adapted or designed for STEM learning. Facilities reflect a focus on STEM learning efforts. Facilities reflect student design anda input in the use of the facilities. Materials and equipment follow safety protocols. Obvious efforts have been made to make resources available to students for use in learning, design and project efforts.

Element	Non-Existent – 0 points	Developing – 1 point	Existing – 2 points	Exemplary – 3 points *(In addition to all "Existing" indicators)*
8b. Allocation for Physical Resources to Support STEM Learning for Students *The allocation and use of resources and space are present to create flexible community learning environments to meet the needs of project-based learning.*	The school does not include and/or does not have evidence of this element in practice at this time.	Work is in progress to develop this element within the school. This element is included in the school's STEM planning document.	- Spaces are available for collaboration and project work. - Facilities have been adapted or designed for STEM learning. - Materials and equipment follow safety protocols.	- Spaces are available for collaboration and project work, and are regularly used by all students and teachers to facilitate learning. - Facilities reflect student design and input on use of the facilities.

Neil Armstrong Academy is the first school in the state of Utah designed from the ground up to fully support a STEM curriculum. The architecture company that built the school, NWL Architects, designed Armstrong to provide the type of environment and supporting spaces required to accommodate science, technology, engineering and math (Figures 1 and 2). The school features raised flooring throughout all of the classrooms to make technology more accessible. It also features three STEM labs (Figure 3), two large group meeting rooms (Figure 4), two STEM preparation rooms (Figure 5), a greenhouse (Figure 6), and a weather station (Figure 7).

The design of each student classroom lends itself to student allow students to engage in critical thinking with each other and experience various problem-based learning activities built heavily on exploration and discussion. Classrooms are also structured to facilitate kinesthetic

movement needs of learning and offer a variety of posture options for student needs (Figure 8). Each room is outfitted with 48″ x48″ tables (slightly smaller in the younger grades). This lends itself well to students having enough individual space and also being close enough to classmates for discussions. Because the tables are perfect squares, students are positioned so they are on equal footing for group discussions and activities. Students sit in what are called "sit-stand" tables, which means seat-to-table height is conducive to students picking if they would prefer to sit or stand. This gives the students the option to seamlessly stand during class discussions and still be roughly the correct height for working at their table. The tables, the stools, and the sit-stand arrangement are intended to facilitate Armstrong students in hands on, collaborative learning activities. With this arrangement, students are more inclined to engage in worthwhile group discussions and activities and to have the freedom of movement during the six-hour school day. Each classroom is also equipped with a small-group meeting table with more traditional chairs for a variety of sitting experiences throughout the day.

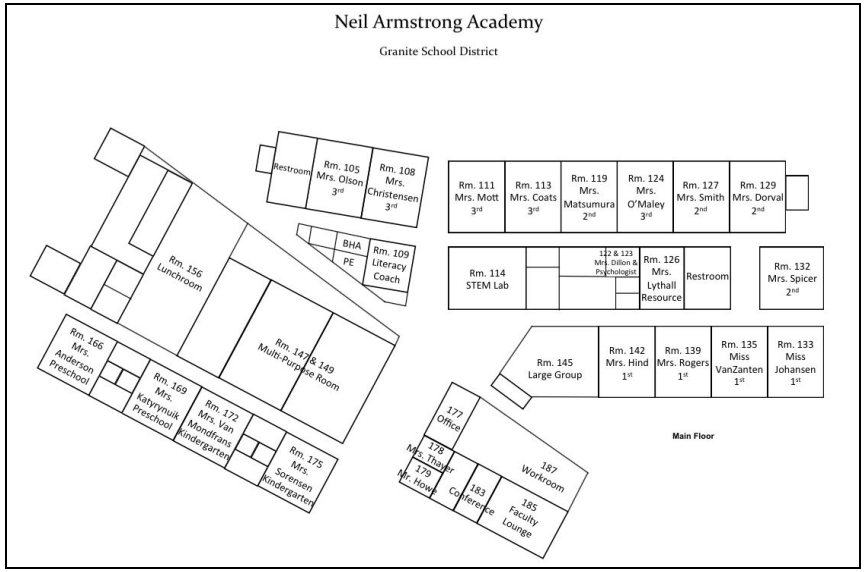


Figure 1. Main Floor

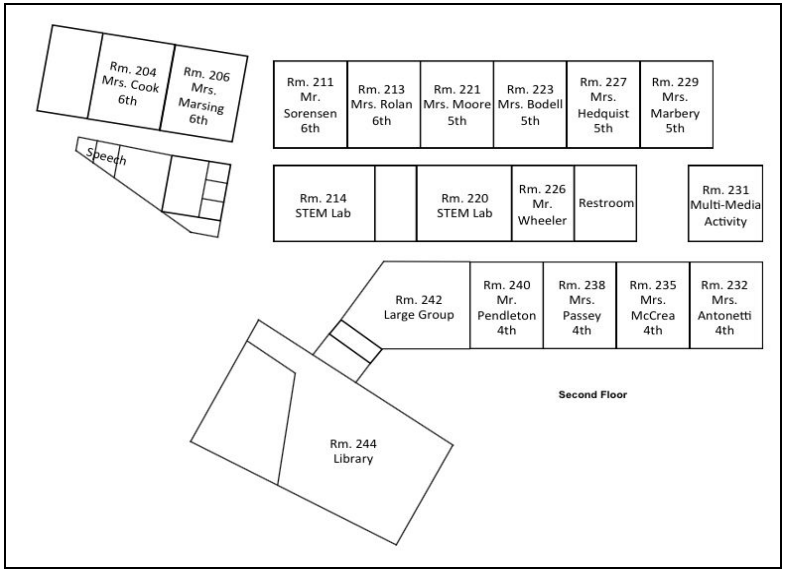


Figure 2. Second Floor

Figure 3. 1 of 3 STEM Labs

Figure 4. 1 of 2 Large Group Meeting Room

Figure 5. 1 of 2 STEM Prep Rooms

Figure 6. Greenhouse/Nursery

Figure 7. Weather Station

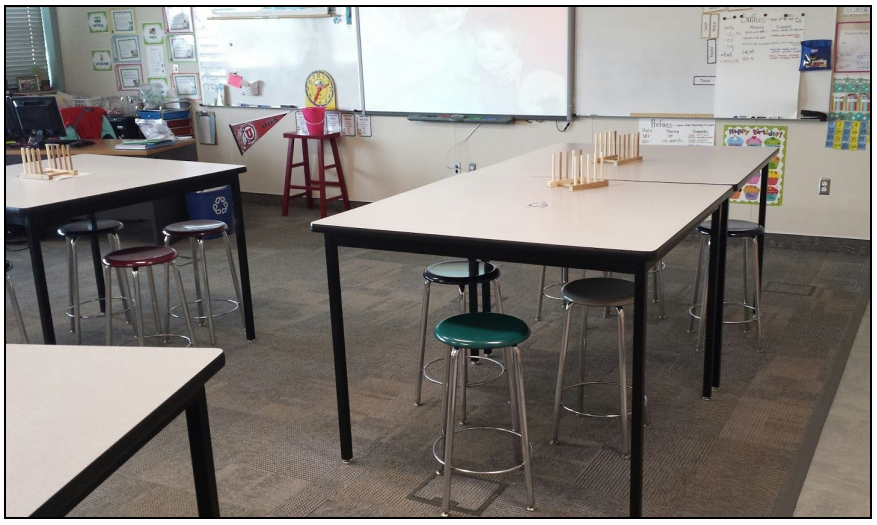


Figure 8. Armstrong Tables and Stools

9. **Strategic Alliances**

Alliances exist between the school and strategic partners. Parents and parent groups are involved in the school process and decision making. Business, industry, and other community partners work together to promote STEM learning and career awareness. Long-term partnerships are formed and supported through ongoing efforts. Partnerships are evaluated at least annually, and additional partnerships are formed to support emerging needs and opportunities. Teachers have ongoing relationships with industry partners and engage in externships.

Element	Non-Existent – 0 points	Developing – 1 point	Existing – 2 points	Exemplary – 3 points *(In addition to all "Existing" indicators)*

9a. Partners Support Instruction and Provide Resources
Partners from industry, institutes of higher education, career and technical centers, etc. participate in and/or support instruction to meet a variety of academic goals, which often includes connecting students with professionals.
	The school does not include and/or does not have evidence of this element in practice at this time.	Work is in progress to develop this element within the school. This element is included in the school's STEM planning document.	- Community members are actively engaged in the vision and work of the school (e.g. curriculum, co-teaching, field experiences).
			- Partners help teachers understand what is expected of a student planning to enter a career in the partner's field.
			- Business, community, and post-secondary partnerships are involved in all STEM classes at least once per school year to:
			  - Develop lesson plans or problem-solving learning projects with teachers.
			  - Provide professional learning.
			  - Provide field experience or site-based learning opportunities.
			- Partners provide resources to support student learning outcomes.
				- The school actively seeks input from partners and integrates suggestions into school-wide strategies
				- Partners recruit other STEM partners to support the school with resources.

Community partnerships play a large role in the school community, decisions, and various aspects of what happens in the building. The school has a close relationship with several departments of the local universities, University of Utah and Brigham Young University. Both universities work with all grade levels to provide help in several ways. One partnership has a team from the University of Utah visiting the fourth grade classes to run a brain health program (Figure 1). Students are allowed to interact with various human brains, become detectives to determine which brains have sustained damage over time, and the possible causes of the damage. Brigham Young University currently has a partnership with the school to provide professional development to all teachers with regards to mathematics instruction (Figure 2). Teachers meet with Sterling Hilton, Department of Educational Leadership and Foundations and mathematics expert, over the course of more than a dozen professional development times. Teachers learn about mathematical understand, the Comprehensive Mathematical Instruction model, and how to best implement mathematical instruction through inquiry.

Neil Armstrong Academy has been fortunate enough to have and currently work with several business partners that provide the school with any number of resources. Many local businesses provide meals to teachers and staff, Little Caesars provides the LEGO League team with pizza for scrimmages with other schools (Figure 3), ELO provided discounts for the hardware and electronics in the building, Adobe provided first grade with a thousand dollar grant for mathematics manipulatives, and the University of Utah (along with other business partners) donated a weather station to the school (Figures 4 and 5).

With regards to community partners career fields, many of the staff are connected to individuals that donate significant amounts of their time to the school. Community members visit classrooms and grade levels to discuss their employment and what they do within their career fields. Grade level teams have also designed tasks that pose a real world problem that a particular field may encounter. For example, the sixth grade students were asked to design a satellite that had the proper amount of solar panels to provide enough energy to the machine. This number was determined by the size of the satellite and calculated by the students. Students were also tasked with designing a system in which the machine would self-launch the solar panels while in space (Figure 6).

Finally, students are able to visit partners to work on specific tasks and problems. The sixth grade paid a visit to Target to learn about purchasing and to calculate values with decimals (Figure 7). First grade paid a visit to a local supermarket (Winco) to learn about the various departments and what each entails (Figure 8). Students were also allowed to work within the various departments during their visit. The second grade visited a farm to learn about the various positions and jobs that take place on the land. Students were provided with lessons and hands-on

opportunities (Figure 9). Finally, the fifth grade visits BizTown annually. The student learn job interviewing skills, are given a job, perform the job for pay, learn to manage their money, make purchases, and vote for mayor (Figure 10).

Figure 1. Fourth Grade Brain Work.

Figure 2. CMI Training.

Figure 3. Pizza Donation to LEGO League.

Figure 4. Weather Station.

Figure 5. Weather Station Donors.

Figure 6. Sixth Grade Satellite

Figure 7. Sixth Grade at Target.

Figure 8. First Grade at Winco

Figure 9. Second Grade at a Farm

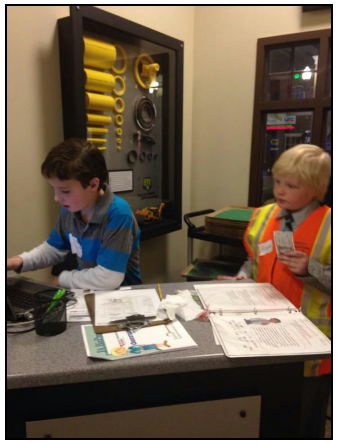


Figure 10. Fifth Grade at BizTown.

9. **Strategic Alliances**

Alliances exist between the school and strategic partners. Parents and parent groups are involved in the school process and decision making. Business, industry, and other community partners work together to promote STEM learning and career awareness. Long-term partnerships are formed and supported through ongoing efforts. Partnerships are evaluated at least annually, and additional partnerships are formed to support emerging needs and opportunities. Teachers have ongoing relationships with industry partners and engage in externships.

Element	Non-Existent – 0 points	Developing – 1 point	Existing – 2 points	Exemplary – 3 points *(In addition to all "Existing" indicators)*
9b. Partners Help Establish and Maintain Community Presence *Partners increase knowledge and visibility of the STEM school.*	The school does not include and/or does not have evidence of this element in practice at this time.	Work is in progress to develop this element within the school. This element is included in the school's STEM planning document.	- Several partners actively showcase student work in their business or elsewhere in the community, and/or support publicity around student STEM learning. - Partners engage in school-related functions with students.	- Partners attend and/or host community events to support the school or showcase student work

Building strong relationships with school and business partners is important to Neil Armstrong Academy. The school recognizes the benefit these partnerships have on the school, the community, and most of all, student learning. To help foster these relationships and partnerships, students have created displays and thank you notes for the various business partners connected to Armstrong.

One item that is on display at the offices of one Armstrong's business partners is a scaled model of a 6th grade classroom that the students created as part of a math and engineering lesson. The model contained everything that is in their classroom, the tables, the stools, even the artwork on the wall This model was donated to Naylor, Wentworth, Lund (NWL) Architecture, the company that designed the school, to display in their offices (Figure 1).

Another partnership that is ongoing, and has provided long-lasting learning experiences, and a connection to nature is the partnership that one grade level has with the Department of Wildlife Resources and Trout Unlimited (Figure 2). These two groups provide trout eggs for students to take care of, observe, and eventually release into the wild. To thank these groups for their dedication to student learning, the students on that grade level created Thank You notes and cards for the groups to read and display in their offices.

Oakbridge Nursery is another company that has donated time, money, and resources to the Neil Armstrong Academy Greenhouse. The whole school has created thank you cards,notes, and posters every year for the Nursery to display in their greenhouse to show it's appreciation for all that they do for students and teachers.

Neil Armstrong Academy has also received support from Little Caesars. The company has generously donated pizza to the schools Lego League team when they are practicing in scrimmages and preparing for competition. In return, the Lego League created a poster for Little Caesars to display in their restaurant saying thank you, and all of the students signed it. They have also donated pizzas and breadsticks as a class reward pizza party for classes who earned enough Moon Bucks.

Recently, the school has started a partnership with Utah Cultural Celebration Center. Each grade level created, designed, and built a gingerbread houses. These gingerbread houses were displayed at the Utah Cultural Celebration Center in West Valley as part of the Trees of Diversity exhibit (Figure 3).

Over the past three years, Neil Armstrong Academy has built a strong partnership with the University of Utah. The U of U's Engineering Department, Brain Science Department, and Atmospheric Science (Weather) department has helped create amazing learning experiences for students at Armstrong (KSL Video) (Figure 4). Recently, The University of Utah's College of Education, has also partnered with teachers to provide

inservice to student teachers so that they may learn how to integrate STEM lessons into their classrooms. Students have created thank you cards and notes to each department to show their gratitude to helping make Armstrong and amazing STEM school.

Lastly, Adobe has been an integral business partner to Armstrong. They have donated thousands of dollars to the school so that it can purchase various educational materials including books, math manipulatives, whiteboards, and more. The school created thank you cards for Adobe to display in their offices to show their appreciation of the company's continuous support of Armstrong and student learning.

Figure 1. 6th Grade Classroom Replica.

Figure 2. 4th Grade releasing their trout.

Figure 3.Gingerbread House.

Figure 4. BYU Pollution Study demonstration.

9. **Strategic Alliances**

Alliances exist between the school and strategic partners. Parents and parent groups are involved in the school process and decision making. Business, industry, and other community partners work together to promote STEM learning and career awareness. Long-term partnerships are formed and supported through ongoing efforts. Partnerships are evaluated at least annually, and additional partnerships are formed to support emerging needs and opportunities. Teachers have ongoing relationships with industry partners and engage in externships.

Element	Non-Existent – 0 points	Developing – 1 point	Existing – 2 points	Exemplary – 3 points *(In addition to all "Existing" indicators)*
9c. Staff Establishes and Maintains Partnerships *Staff creates and develops partnerships with organizations external to the school.*	The school does not include and/or does not have evidence of this element	Work is in progress to develop this element within the school. This element is	- Some staff members at this school create external partnerships with the school, such as with colleges, universities, businesses, or institutions. - Staff members work collaboratively with the school's external partners.	- Most staff members this school create and maintain external partnerships with the school, such as with colleges, universities, businesses, or institutions.

	in practice at this time.	included in the school's STEM planning document.		

Developing and maintaining external partnerships has been of the utmost importance to the staff at Neil Armstrong Academy. Several of the staff members have forged various relationships with universities and businesses and use these partnerships in a variety of ways. For example, our first grade teachers have a partnership with a local supermarket (Figure 1). During the school year, students visit the supermarket to learn about the community and the types of jobs that are done at these types of businesses. The sixth grade does something similar to this as well. The sixth grade team has a relationship with Target, and students visit at various points of the school year (Figure 3). One of these projects required students to work in teams to compare products and find the unit cost for each to determine which was the better deal. Not only does this allow the student to master mathematical skills found in the Utah Core Standards, it provides a real world skill that may be used immediately.

One of the strongest relationships the Academy has is with the University of Utah. Several teachers in the building have connections with staff members at the U of U. For example, the university has partnered with fourth grade to teach students about engineering and brain science (Figure 3). Employees from the university bring in human brains and allow the students to hold and touch the brains as they discuss the importance of brain health, brain damage, and brain safety. Detached cockroach legs are attached to electrodes and "dance" to music as electricity courses through their limbs. The employees also bring in optical illusions and other activities to fully engage students. The University of Utah, along with several other donors, purchased a weather station for Neil Armstrong Academy. It is a fully functioning weather station that features an interactive screen that allows students to check on the weather, wind speed, solar radiation, and a plethora of other details at stations across the state. The station also collects data and reports back to the University. In addition to these examples, some teachers are working on new opportunities with the U of U. One such teacher is currently in talks with a employee at the University that works in the science department and is also employed with the Department of Defense. The teacher and university employee are discussing a way to bring in his team to work with students on various projects throughout the year.

The Academy has a range of other partnerships. Little Caesars donated pizzas to the Lego League (Figure 4), classes decorated gingerbread houses that were donated to the West Valley Community Center for their City Culture Night, and The Department of Wildlife Resources works with the students at the school to hatch trout that will eventually be placed back into the wild. A local nursery and Lowe's donated several hundred dollars worth of soil and seeds to the greenhouse at the school (Figure 5). Each class has an assigned box in the nursery in which they grow various types of plants. Brigham Young University and members from the Utah Clean Air Act committee are currently working on updating the nursery and providing additional resources to the school. Adobe has donated money for books, mathematics manipulatives, and a mixture of other items. Last, but not least, LEO Touch has provided discounts to the Academy on various hardware and electronics purchases throughout the year, saving the school thousands of dollars.

Figure 1. 1st Grade Supermarket Visit

Figure 2. 6th Grade Target Visit

Figure 3. 4th Grade Brain Science

Figure 4. Little Caesars Donation to LEGO League

Figure 5. Nursery

10. **Advancement and Sustainability**

A five-year plan includes each of the criteria for an effective STEM school. Strengths and weaknesses are identified. Plans are in place to address weaknesses with evidence and research supporting the plan. Strengths are examined for the purpose of continued improvement. Future efforts and trends are examined, and ongoing renewal is planned for.

Element	Non-Existent – 0 points	Developing – 1 point	Existing – 2 points	Exemplary – 3 points *(In addition to all "Existing" indicators)*
10a. Development of a Five-Year Plan on Goals and Benchmarks for Community Strengths *The school has a five-year plan that includes evaluation of each of the criteria for a STEM school. Examination of strengths takes place for the purpose of continued improvement.*	The school does not include and/or does not have evidence of this element	Work is in progress to develop this element within the school. This element is included in the school's STEM planning document.	- The plan was created by multiple stakeholders and includes at least two strengths to build upon.	- The school plan includes plans for sustainability and improvement regardless of changes in

	in practice at this time.			leadership or staff with LEA support.

A shared vision must be at the center of any efforts to create a sustainable push towards excellence. Neil Armstrong Academy has a clear Mission, Vision, and Values statement. These values are held dearly by the faculty, staff, and community. When hiring new faculty, efforts are made to find competent teachers, whose views are consistent with the school's mission, vision, and values. Community members are expected to hold one another accountable to these values. STEM is not a marketing ploy or a novelty, but a passion at Neil Armstrong Academy and is reflected in our mission, vision, and values. They are discussed and lived on a daily basis.

The depth of ownership for the school's mission, vision, and collective commitments at Neil Armstrong is heavily influenced by two factors. The first is that the school and the faculty was built from the ground up with STEM in mind. Faculty members applied and were selected in part for their commitment to STEM. It was important to build a staff that shared STEM values and were eager to support them. The second factor in the communities commitment to the values of STEM lies in the fact that many of the parents sought the school out because they wanted their student to attend a STEM school. This means that our collective commitment extends and is deeply embedded in our community at large.

Mission Statement

At Neil Armstrong Academy, we are committed to a focus on learning, high levels of engagement, and a problem-solving process common to the science, technology, engineering, and math (STEM) fields to prepare all students with the skills they will need for their future.

Vision Statement

Teachers and staff will continuously focus on student-learning outcomes as they work collaboratively to address the questions: (1) What do we want our students to learn? (2) How will we know when each student has learned it? (3) How will we respond when some students don’t learn? and (4) How can we extend and enrich the learning for students who have demonstrated proficiency? We will use many forms of data to drive student achievement.

Collective Commitments

- I am responsible for my own learning.
- I will feel safe to try, fail, and try again until I succeed. I will encourage others to feel safe as well.

- I will share my skills, talents, and ideas, and be open to change.
- I am committed to the belief that everyone can learn.
- I will participate during group activities, and I will speak positively with one voice once the group has chosen a direction even if it wasn't my first choice.
- I will make a difference in the community.

10. **Advancement and Sustainability**

A five-year plan includes each of the criteria for an effective STEM school. Strengths and weaknesses are identified. Plans are in place to address weaknesses with evidence and research supporting the plan. Strengths are examined for the purpose of continued improvement. Future efforts and trends are examined, and ongoing renewal is planned for.

Element	Non-Existent – 0 points	Developing – 1 point	Existing – 2 points	Exemplary – 3 points *(In addition to all "Existing" indicators)*
10b. Development of a Five-Year Plan on Goals and Benchmarks for Improvement *The school has a five-year plan that includes evaluation of each of the criteria for a STEM school. Examination of weaknesses takes place, with evidence and research supporting the plan.*	The school does not include and/or does not have evidence of this element in practice at this time.	Work is in progress to develop this element within the school. This element is included in the school's STEM planning document.	- The plan was created by multiple stakeholders and includes at least two weaknesses to address.	- The school plan includes plans for sustainability and improvement, regardless of changes in leadership or staff with LEA support.

Neil Armstrong has five year plan that began the summer it opened. Armstrong opened in fall of 2013. Having only two and a half years of experience as a school and having a hand pick faculty of the highest caliber has both good and bad. Certainly far more good than bad. From the very beginning there has been an expectation for greatness. Armstrong has had an amazing beginning with teachers teachers and our administrator being honored district wide for their performance. Our scores are among the very best in the state as attested to by our nomination to apply for federal designation as a Blue Ribbon School. Success however, can blind you to your weaknesses. We don't ever want to think that we have arrived. There is so much more we can do as a school.

The year we opened we began professional development efforts on the nature of STEM education, Launch Explore Discuss, the Comprehensive Framework for Math Instruction (CMI), TILT (Teachers Increasing Learning Through Technology), PSIA (Physical Science Inquiry Academy) and more. These PD efforts are continuing today. Some of the trainings like TILT have been completed while others are ongoing like our CMI training. The process of applying to be a USOE designate STEM school has given us a chance to look back on our accomplishments and assess where we have still to go.

Each year we as a school we evaluate our performance based on data from SAGE, DIBLES, Granite's quarterly benchmarks, teacher and team created CFAs, surveys like the Conditions for Learning. This evaluation occurs on many levels within the school. These levels include teacher as individuals, grade level teams, our leadership team, administration, parents, and students. We evaluate ourselves and each other in appropriate ways. In coming years reevaluating ourselves relative to citera in this application will be part of this process.

Our goal is to be the best STEM school in the state of Utah and recognized nationally for our educational practices. To be the best we will need to work on our weakness. Going through the STEM application process we identified several weakness. They include the following:

- Students reflect on the strengths and weaknesses of their learning approaches
- Student Participation in Decision-Making
- The school has a student induction process, program, or activities that supports new students' transitioning to the school in ALL grade levels.
- Students participate in post-secondary education exposure activities, such as college tours, and in career-readiness experiences.

As school we will take a systematic approach to incorporating our efforts to improve in these areas into our current plans for long-term plans, while maintaining our focus on current efforts to refine what is anecdotally and statistically a great school.